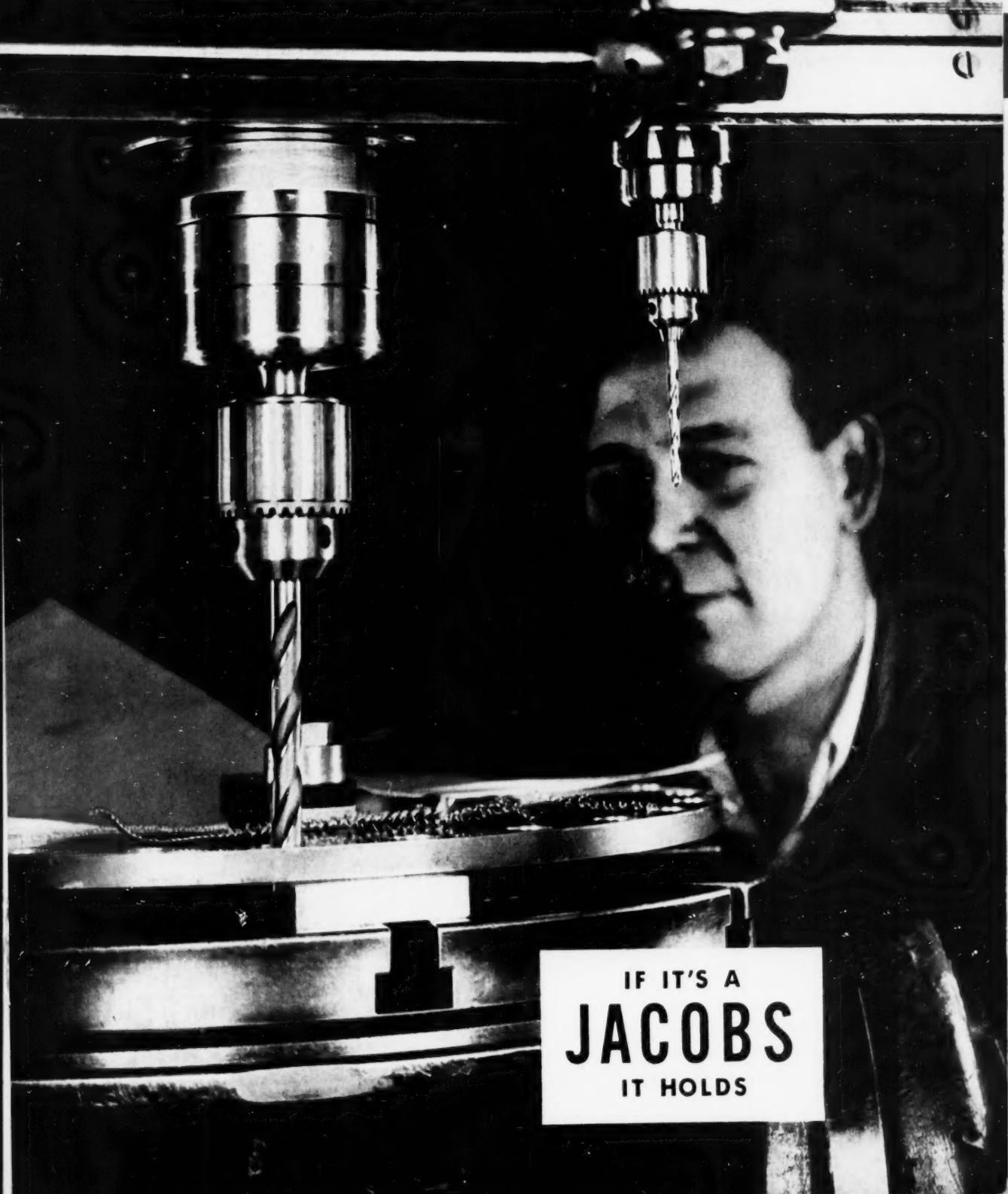


JUNE 1954 - SIXTIETH YEAR

# MACHINERY



IF IT'S A  
**JACOBS**  
IT HOLDS

**No. 5**

CONTAINS  
7  
CUTTING SIZES

$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$
$\frac{7}{8}$	$\frac{1}{2}$	$\frac{3}{4}$

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# *Little Giant* SCREW PLATE

ADJUSTABLE DIE

TWO PIECE  
In threading use that taps or dies are straight with work. After starting, do not reverse. Loosen guide with wrench and unscrew from cap. To remove dies from collet, place collet in die stock and adjust cutting size. Loosen guide and turn adjusting screws. (Adjusting screws are the two small screws in collet, one at each end of the die.)  
In ordering extra parts, specify the sizes and threads of taps and dies, and numbers of stocks and tap wrenches, also give number of screw plate.  
Extra parts are GUARANTEED to fit as the parts of all Little Giant Screw Plates are absolutely interchangeable.



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5/16	7	1	1 3/4	3	3
3/8	5 1/8	25 64	2	1 1/2	21 64
7/16	U	29 64	1 1/2	1 1/2	19 64
1/2	27 64	33 64	1 1/4	1 1/4	17 64
9/16	31 64	37 64	1 1/4	1 1/4	15 64
5/8	17 32	11 16	1 1/4	1 1/4	13 32
3/4	21 32	13 16	1 1/4	1 1/4	11 32
7/8	49 64	15 16	1 1/4	1 1/4	9 32
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The Monthly Magazine of Engineering and Production  
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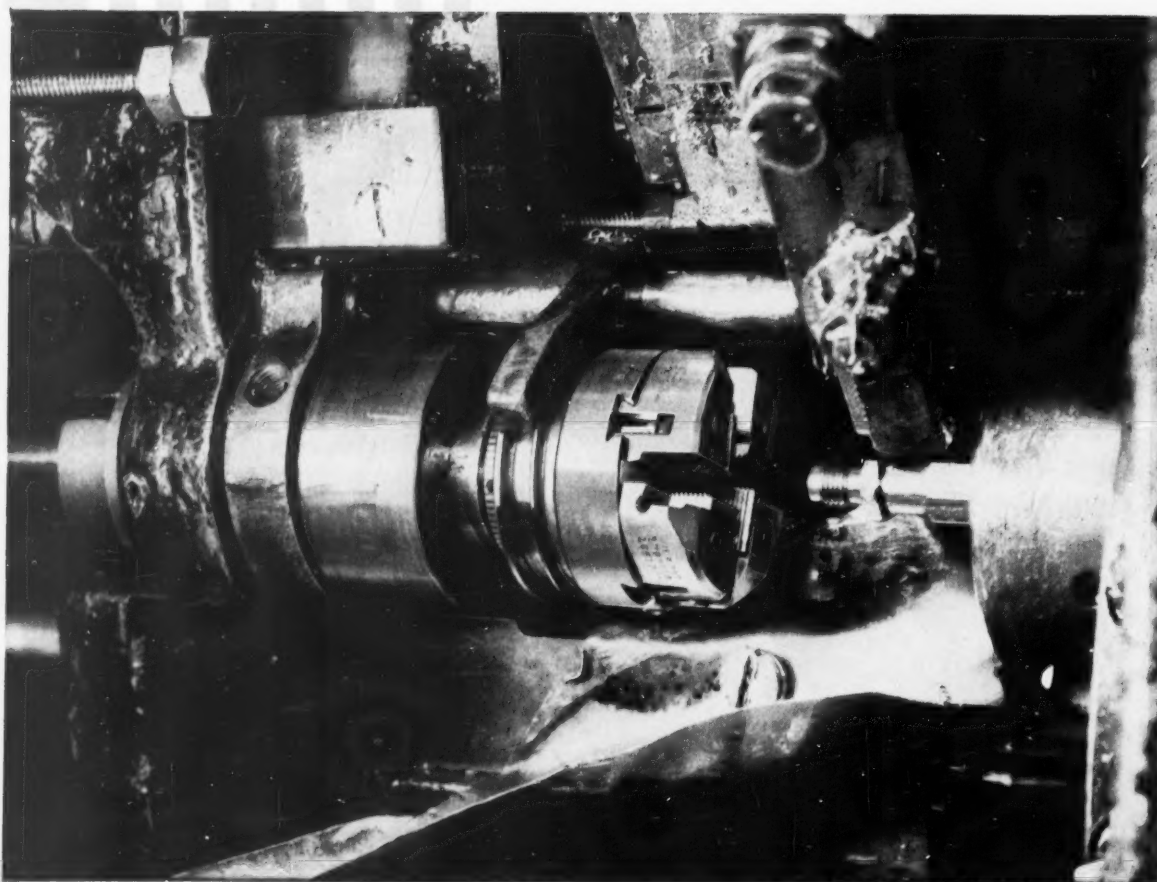
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413-414

# **Economy Limited Clearance**



# Threading On Automatics....



To assure economy threading on automatic screw machines where limited die head clearance is a major factor Frank H. Wilson Co., Inc. in Detroit, Michigan use the  $\frac{1}{2}$ " LL LANDEX Head. Applied to one of their small Acme-Gridley's for threading tubing nuts this head cuts  $\frac{1}{2}$ ", 20 pitch UN threads  $\frac{3}{8}$ " in length on B1113 screw stock to a class three fit. An average of 20,000 pieces are threaded between chaser grinds.

Compactly designed with only a  $2\frac{7}{16}$ " swing the  $\frac{1}{2}$ " LANDEX will thread all diameters from #4 to  $\frac{1}{2}$ ". A minimum number of working parts made of hardened and ground alloy steel, chaser holders designed to eliminate warpage and springing, and the use of precision LANDIS Tangent Chasers - - - all contribute to the high degree of rigidity and accuracy of this LANDEX Head.

Compare the chaser lengths in the illustrations and note the long life this LANDIS User has received from the chasers used in this application. These chasers will still produce thousands of threads as (1) LANDIS Tangential Chasers are usable for 80% of their original length; (2) only a few thousandths of metal need be removed from a chaser when regrinding; (3) when regrinding the same amount of metal need not be removed from each chaser; (4) long chaser life is received between grinds. These are the basis for economy in any threading operation.

For further information on this LANDEX Head and on other LANDIS Heads using Tangential Chasers and designed for all types of thread-cutting operations write for Bulletins F-80 and F-90. Please send specifications when writing.

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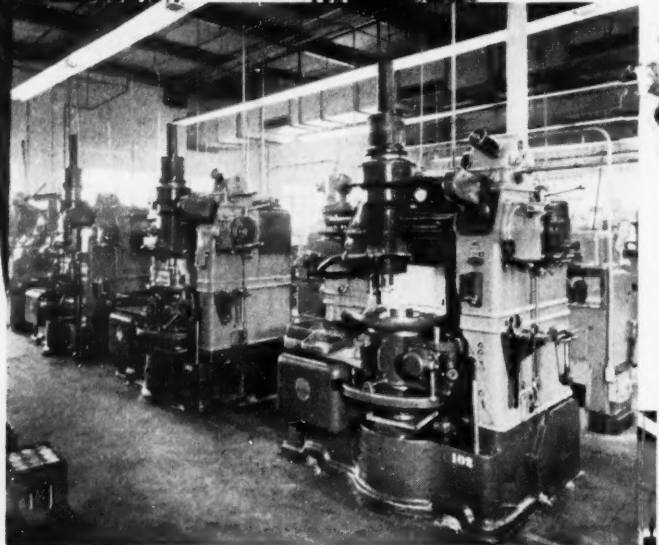
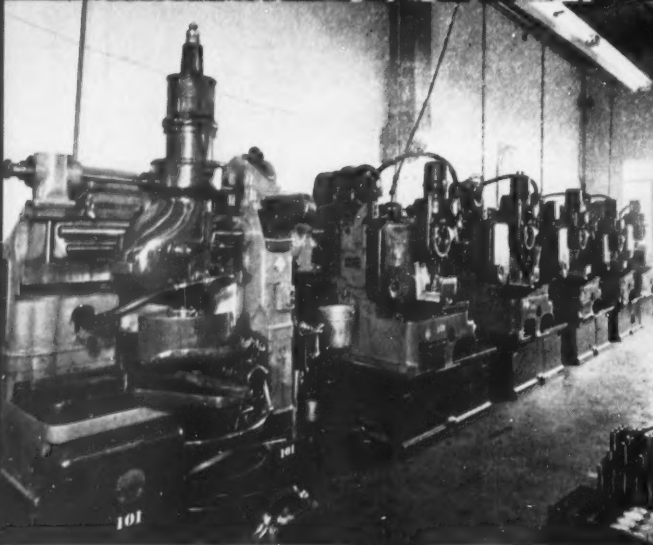
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THE **LANDIS** *Machine* CO.

WAYNESBORO  
PENNSYLVANIA



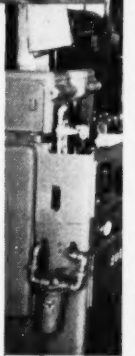
# PRECISION



*Above: Three of the 6-A Type Gear Shapers in line with a No. 12 Fellows Shaving Machine at the Frohman #1 Plant in Miami.*

*Above left: An additional 6-A and a battery of 7-A and 7-Type machines at the same plant.*

*At right: The line-up of 3-Inch Gear Shapers and No. 4 Fellows Shaving Machines face each other in efficient-handling proximity.*



# Fellows



# Pays Off under MIAMI's Sun, too!

A reputation for Extra High Quality Gears can make itself known against a Florida background as readily as anywhere 'up north'... Harry Frohman found it so when he located his Frohman Manufacturing Co. in Miami—equipped the shop with Fellows machines, tooled up with Fellows Cutters and began making the plant a prime source of good gears. Aviation and instrument gear contracts, in particular, have flowed in Frohman's direction *for very good reason.*

Samples of gears in current production with the specified tolerances, etc., are illustrated here, along with the line-ups of Gear Shapers on which they are cut. The invisible ingredient is the very low percentage of rejects which so largely contributes to cost economy.

Whether in Miami, Milwaukee, or Monterey, the Fellows Method is a sound approach to keeping costs *down* and quality *up*. For specific machine or method information, wire, write or telephone the nearest Fellows office.



## TYPICAL GEAR JOBS

*The gear items pictured and detailed here are selected from hundreds in production and scheduled for early delivery from the Frohman Plant.*



Description	Ext. Gear and Spline	Ext. Gear and 2 Int. Splines	Ext. Spline and Int. Spline	External Gear
Pitch Diameter	7.375"	3.036"	4.2182"	4.833"
Diameter Pitch	16 and 20/30	9.881, 20/40 and 11	32/64 for both	24
No. Teeth	118 and 30	30, 29, and 28	137 and 112	116
Press. Angle	25° and 30°	22½°, 30° and 20°	30°	14½°
Material	Nitralloy 135 Mod.	SAE 9310	SAE 8740	Alum. Bronze
Limits	.0005"	.0005"	.0005"	.0005" TIR
Notes	Spline cut after hardening to Rc 32/36	20/40 spline cut after hardening	All cutting after hardening to Rc 32/38	Cut @ 4 pc. loading

## GEAR SHAPER COMPANY

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Surest Cure for Your High Toolroom

**CINCINNATI**

**Cincinnati  
No. 2MI**







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taking a heavy form milling cut

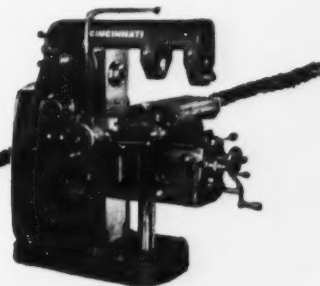
**CINCIN**



# Milling Costs

Are you provoked at slow toolroom milling operations and inaccurate work? Fed up with maintenance bills? You can cure these and other ills of high cost toolroom milling by replacing your old equipment with new CINCINNATIS... in the No. 2 range, for example, with Nos. 2ML or 2MI. Reasons why these machines are good medicine for shops of all sizes are many.

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Other advantages of CINCINNATI Nos. 2ML and 2MI Milling Machines may be of even greater value in your shop. May we tell you more about them? Brief specifications will be found in Sweet's Machine Tool File, and complete data may be obtained by writing for catalog No. M-1662-2.

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MACHINERY, June, 1954—7

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adds this new  
**CRUSH-DRESSER**  
to the

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**DIVERSIMATIC<sup>®</sup>**  
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**Grinder**

**VAN NORMAN**

Manufacturers of — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

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Regulating Wheel 8" O.D. x 4" Wide.  
Can be used for standard  
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Attachment. It dresses the wheel to the desired contour and holds the form hundreds of pieces between wheel dressings, imparting the exact profile to the work. Also finish grinds rough-turned parts. Grinds faster, holds tolerances, cuts costs. Write for full details about the Diversimatic, today.

## COMPANY

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with this  
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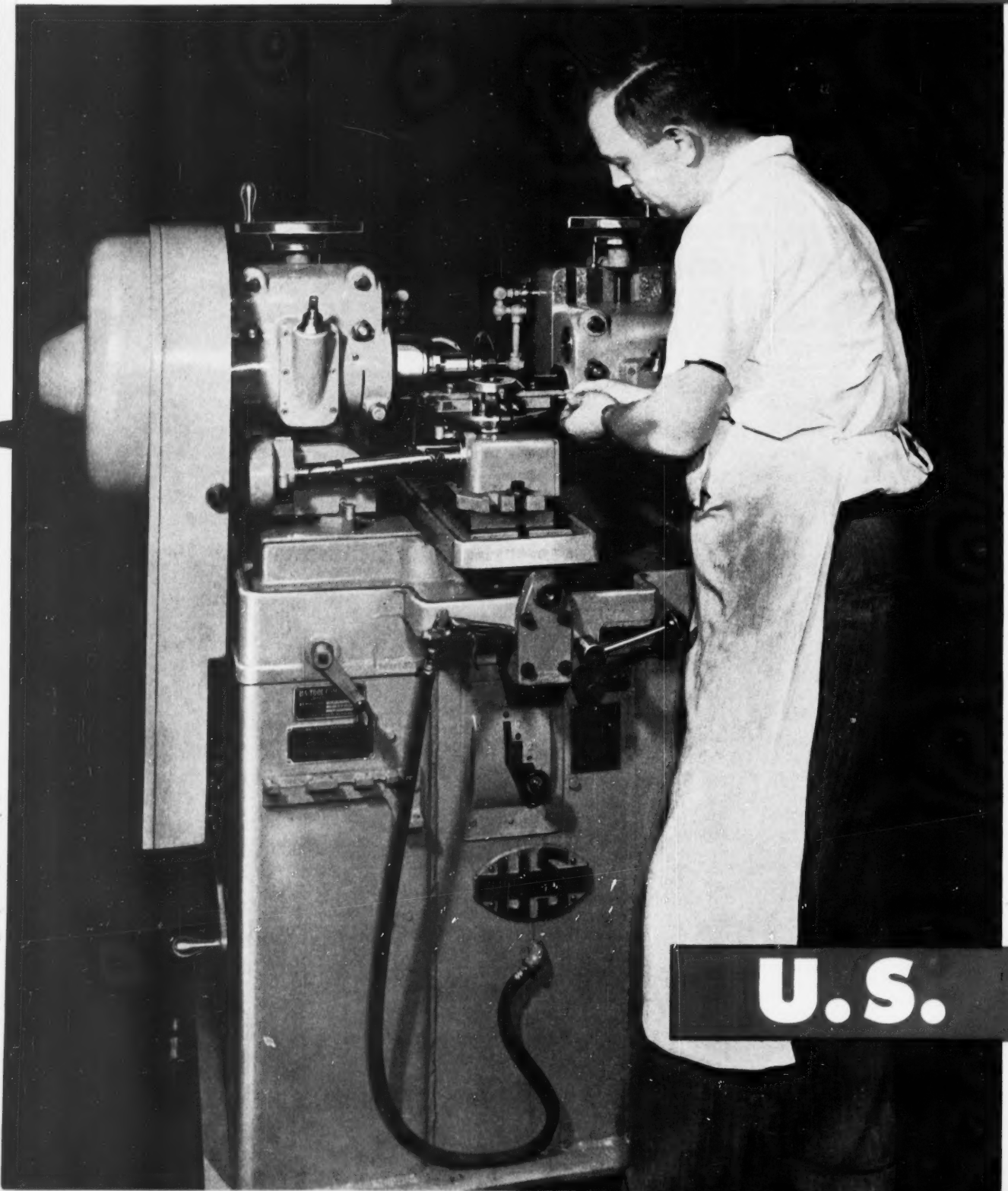
**LANDIS**

precision grinders

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U.S.A.

For Profitable Production of Small and Medium Sized Parts

# The U. S.

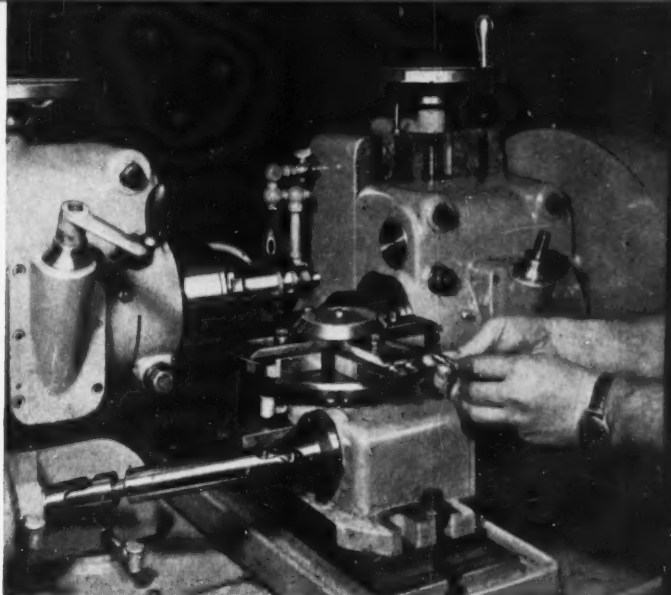


**U.S.**



# MULTI-MILLER

**1,440 Slots  
Milled per Hour  
on Small  
Precision Part!**



**EQUIPMENT USED**—The setup illustrated by the photographs on this and the facing page consists of a U. S. Duplex Multi-Miller with two opposed spindles arranged with a four-station automatic indexing fixture to mill two slots spaced 180° apart on two pieces simultaneously.

**PROCEDURE**—The operation of the machine is automatic except for the loading and unloading of the pieces by the operator. Once started, the machine does not stop. The loading and unloading of the four-station automatic indexing fixture takes place during the machine cycle. The cycles of table feed and indexing are entirely automatic.

**PRODUCTION**—Two completed pieces (with two slots in each) are produced at each cycle of the machine, which is ten seconds. Since two pieces are produced per cycle, the gross production is 720 pieces per hour, or a total of 1,440 slots.

If your operations include milling on small and medium sized pieces, the U. S. Multi-Miller may be the answer to some of your production problems. Ask for a copy of Bulletin 25-M, which contains complete specifications.

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AMPERE (East Orange)

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They are prepared to work out the best lapping techniques for your requirements. For full details, see your Norton Representative or write us direct. NORTON COMPANY, Machine Division, Worcester 6, Mass.

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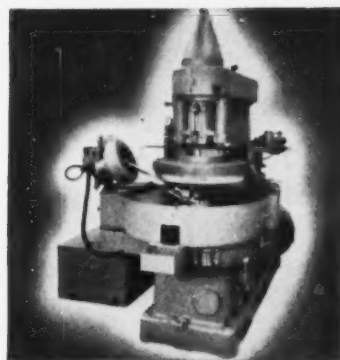
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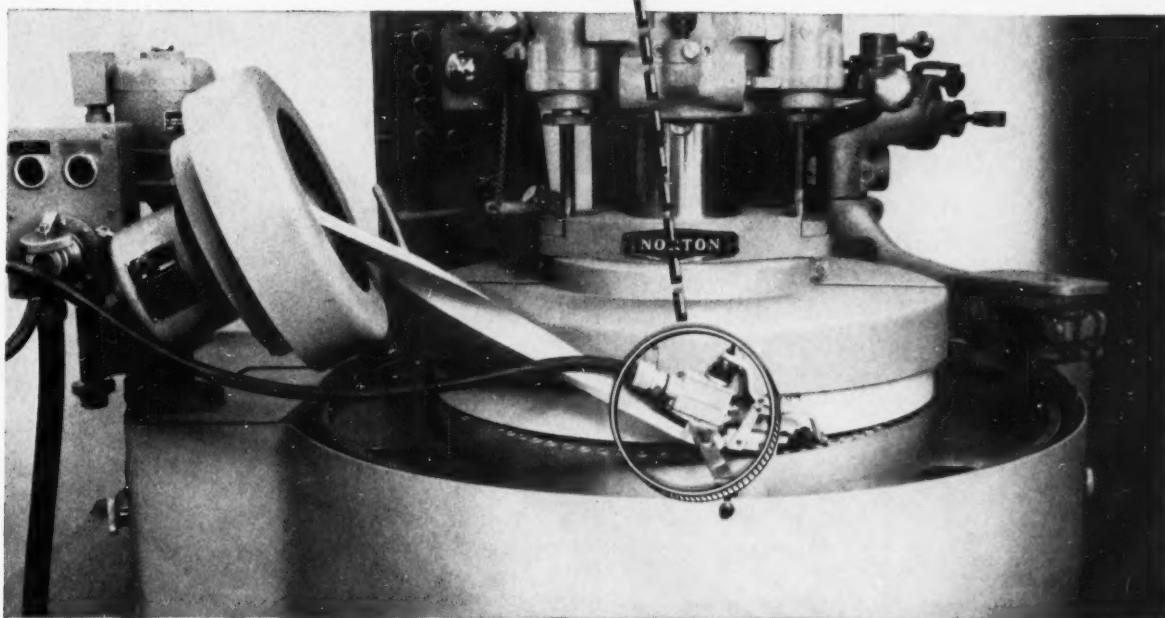
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# On small, flat parts the Norton Thru-Feed Lapper

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savings*



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*Automatic Loading Arrangement of Norton 26 Hyprolap lapping machine makes sure parts are in correct position before entering feeding trough . . . prevents ganging up . . . directs work in a path that assures even lap wear.*

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Now you can make 4-to-1 savings in lapping small parts . . . and get top-quality results on every job. Investigate new Norton 26 Hyprolap lapping machines with the exclusive built-in thru-feed mechanism.

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to make other products better*

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For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—15



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HAVE TAPS WITH  
**BALANCED**

△  
*Action*

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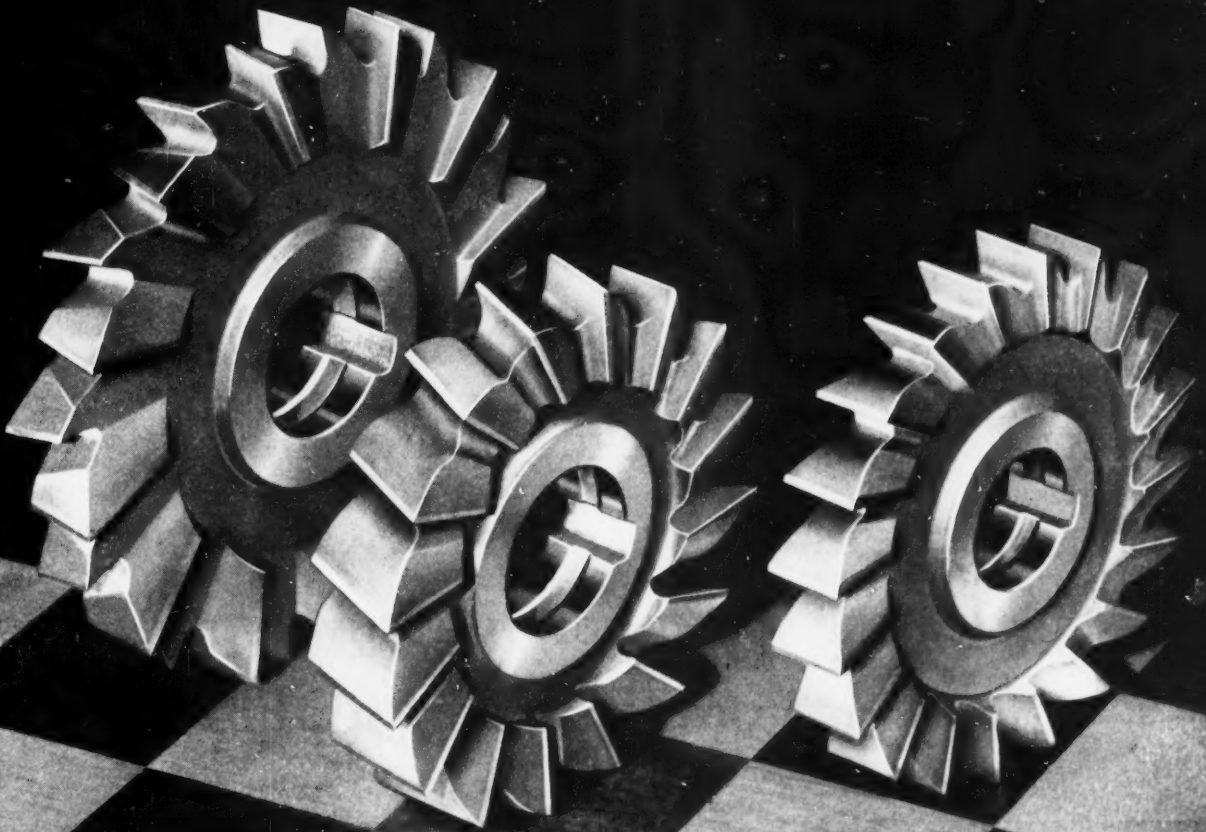
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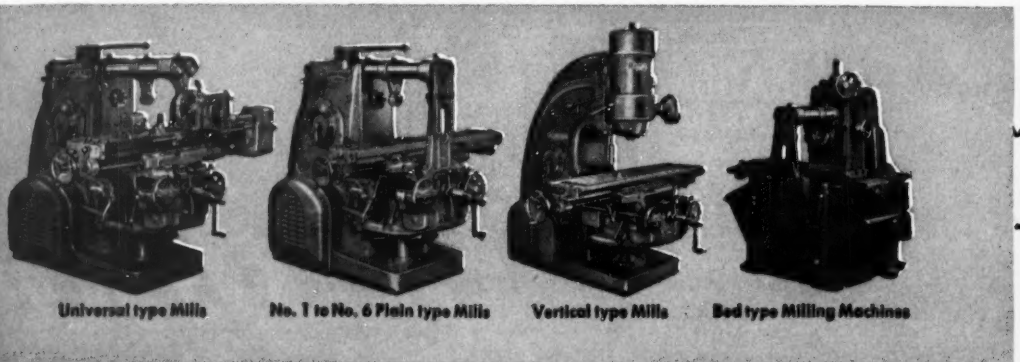
# National

# When profits decline... bring costs in line with

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New Kearney & Trecker milling machines  
and precision boring machines...available  
for leasing...can help improve your  
competitive position and PROFITS

*Kearney & Trecker  
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complete line of  
more than 250  
standard knee and  
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machines and  
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Universal type Mills

No. 1 to No. 6 Plain type Mills

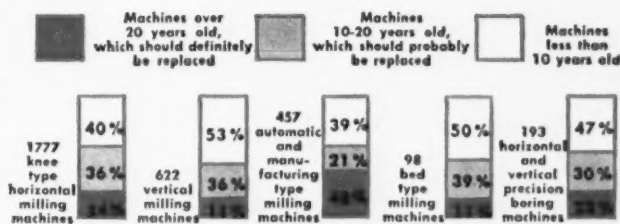
Vertical type Mills

Bed type Milling Machines

## MACHINE TOOL OBSOLESCENCE IS BECOMING CRITICAL! WHERE DO YOU STAND?

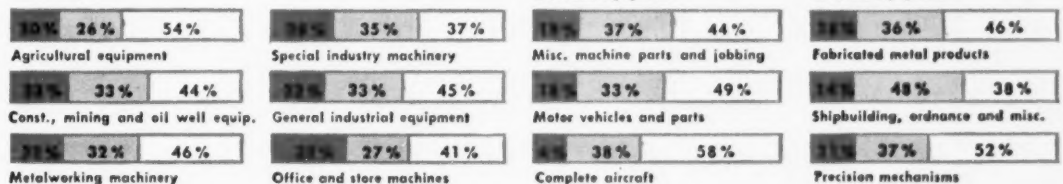


Here's the picture in a typical basic industry—CONSTRUCTION, MINING & OIL WELL EQUIPMENT—(see chart at right). Of the 3300 standard knee type horizontal, vertical, bed and manufacturing type milling machines and precision boring machines in use today — which could be replaced by Tool-Lease equipment — 33% are 10-20 years old, 23½% are more than 20 years old!



### HERE'S THE OVERALL PICTURE IN THE ABOVE AND 15 OTHER BASIC INDUSTRIES

Of the 150,825 machine tools in these industries of the types covered by Tool-Lease — 18% are over 20 years old and 38% are from 10-20 years old. A break-down on any of these industries will be furnished upon specific request.



Figures for this presentation adapted from 1953 McGraw-Hill survey of metalworking industry.

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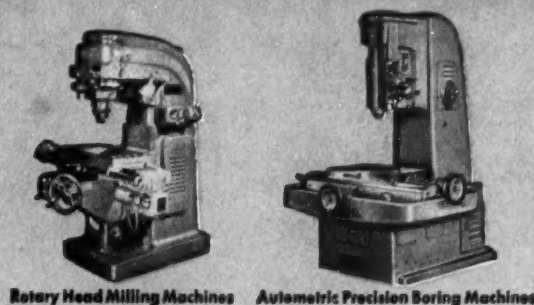
equipment. If you require special machinery or heavy-duty CSM bed types, special agreements will be considered.

### GET ALL THE FACTS NOW

For complete information on Tool-Lease . . . help in analyzing your milling and/or precision boring needs — see your Kearney & Trecker representative or mail coupon to Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.



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Rotary Head Milling Machines

Automatic Precision Boring Machines

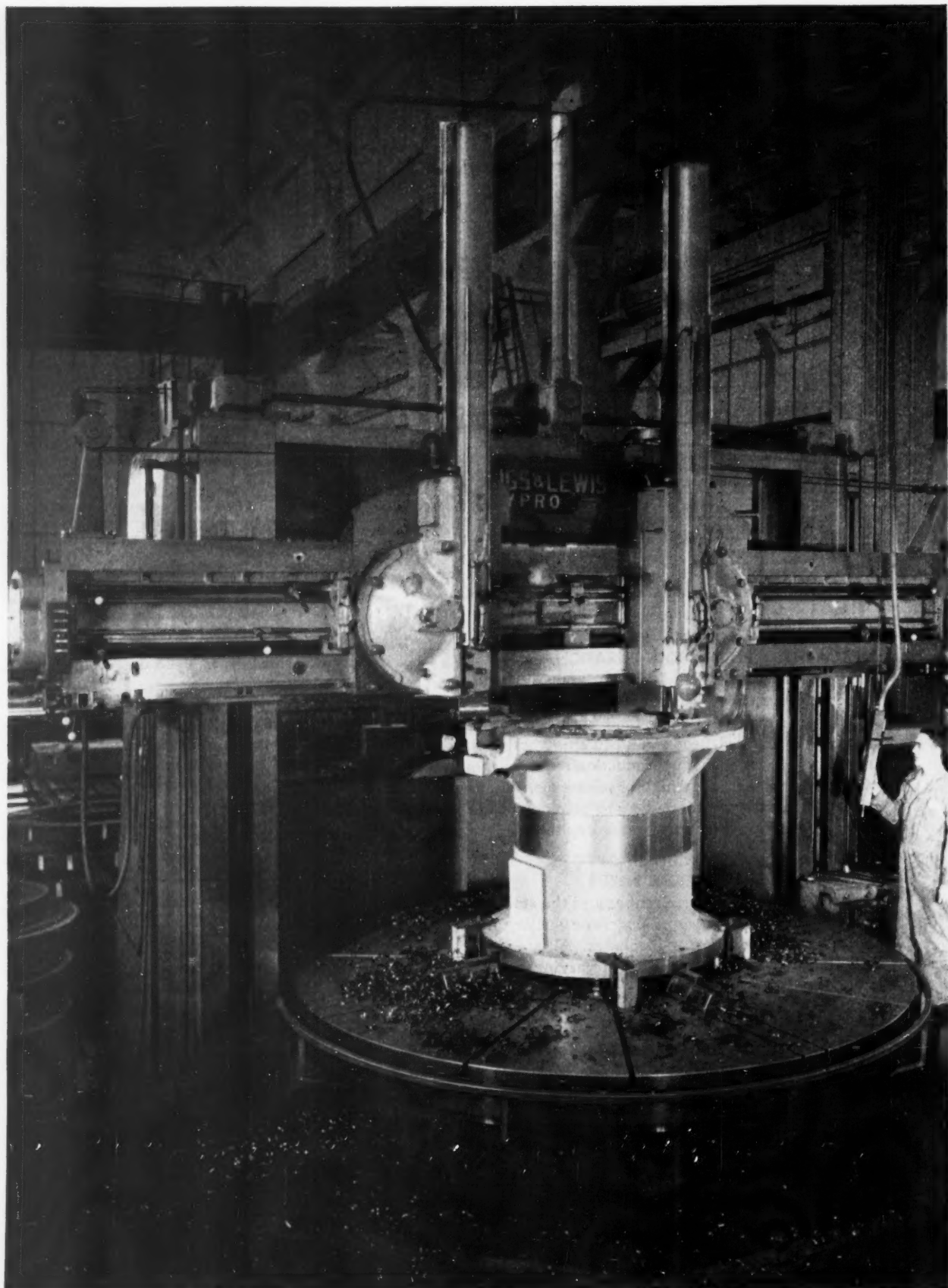
Kearney & Trecker Corporation  
6784 W. National Ave.  
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Please send me Bulletin TL-10A with details on the Tool-Lease Program or call Milwaukee, Greenfield 6-8300.



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**This G&L 12-ft. Hypro Vertical Boring Mill bores, turns, chamfers, faces, counterbores, grooves or recesses with equally high efficiency. It gives you speed, precision and ease of handling... capacity that earns more interest on your machine tool investment.**

Like all Giddings & Lewis heavy-duty machine tools, G&L Vertical Mills offer you truly advanced design... features far ahead of their time.

For example: G&L design employs an anti-friction taper roller bearing to take table radial thrust. On the 10' and 12' machines heavy-duty, wide-surface, non-metallic table tracks are used to support table and load.

In addition to this and many other standard features, you also have a choice

of many optional features such as a two-dimensional contouring control and a wide range variable speed table drive. The latter automatically provides for proper surface speed of the cutter.

It's advanced engineering like this that helps you obtain the unusual capacity so vital to earning more interest on your investment... getting longer-lived, trouble-free performance. It's one of the many reasons why a G&L machine tool is "often copied, never equalled."



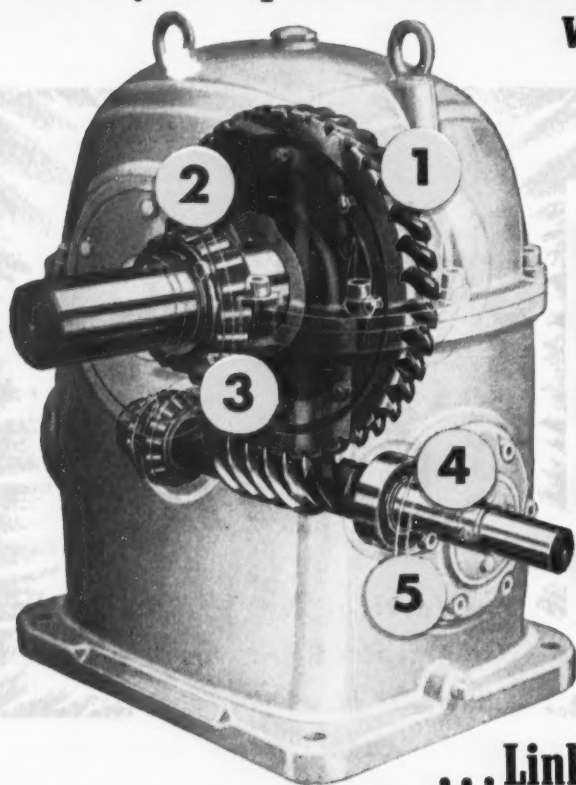
**GIDDINGS & LEWIS  
MACHINE TOOL CO.**

FOND DU LAC, WISCONSIN



*Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.*

**When your speed reduction job calls for high ratios  
with right-angle takeoff...**



- 1 NICKEL-BRONZE WORM GEARS**, chill cast in dry sand, combine low coefficient of friction with high tensile strength.
- 2 HIGH-CAPACITY ROLLER BEARINGS** take both thrust and radial loads. Lower wear and friction losses reduce maintenance.
- 3 ALL-SPEED EFFICIENCY** results from reduced sliding action between worm threads and gear teeth, plus smoother power delivery.
- 4 ONE-PIECE FORGED SHAFTS** are alloy steel, carburized and heat-treated for great impact resistance.
- 5 AUTOMATIC SPLASH LUBRICATION** reliably supplies oil to all bearings and gear teeth at all speeds.

## **...Link-Belt gives you everything you want in WORM GEAR DRIVES**

**W**ITH their compact, high-strength design, Link-Belt Worm Gear Drives permit high-ratio speed reductions in small space. High input speeds and low output speeds are provided, with ample capacity for heavy loads.

Three basic types cover the complete field of application: Single worm gear drives, helical worm gear drives and double worm gear drives. All are available with either horizontal or vertical shafts, and single or double gear reductions for convenient

and compact connection.

Link-Belt Worm Gear Drives are available in 3.1:1 to 8000:1 reduction ratios, 1400 to 123,000 in. lbs. torque—0.22 to 564 output shaft rpm. Ask for Book 2324-A.

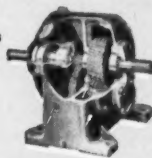
**LINK-BELT** 13,402  
**ENCLOSED GEAR DRIVES**

### **WHY PRE-INTEGRATED LINK-BELT DRIVES CUT YOUR POWER TRANSMISSION COSTS**

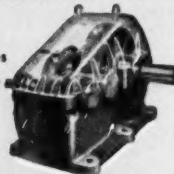
In addition to all three types of enclosed gear drives, Link-Belt builds variable speed drives, fluid drives—chains, sprockets, couplings, bearings, shafting, etc. All are pre-engineered for easy installation and maximum efficiency.



Gearmotors  
—ask for  
Book 2247



Helical  
Gear Drives  
—ask for  
Book 2451



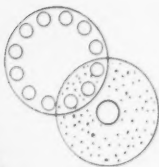
Parallel  
Shaft  
Gear Drives  
—ask for  
Book 2519

**LINK-BELT COMPANY:** Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

## *How an abrasive disc was tailored to a special work carrying fixture*

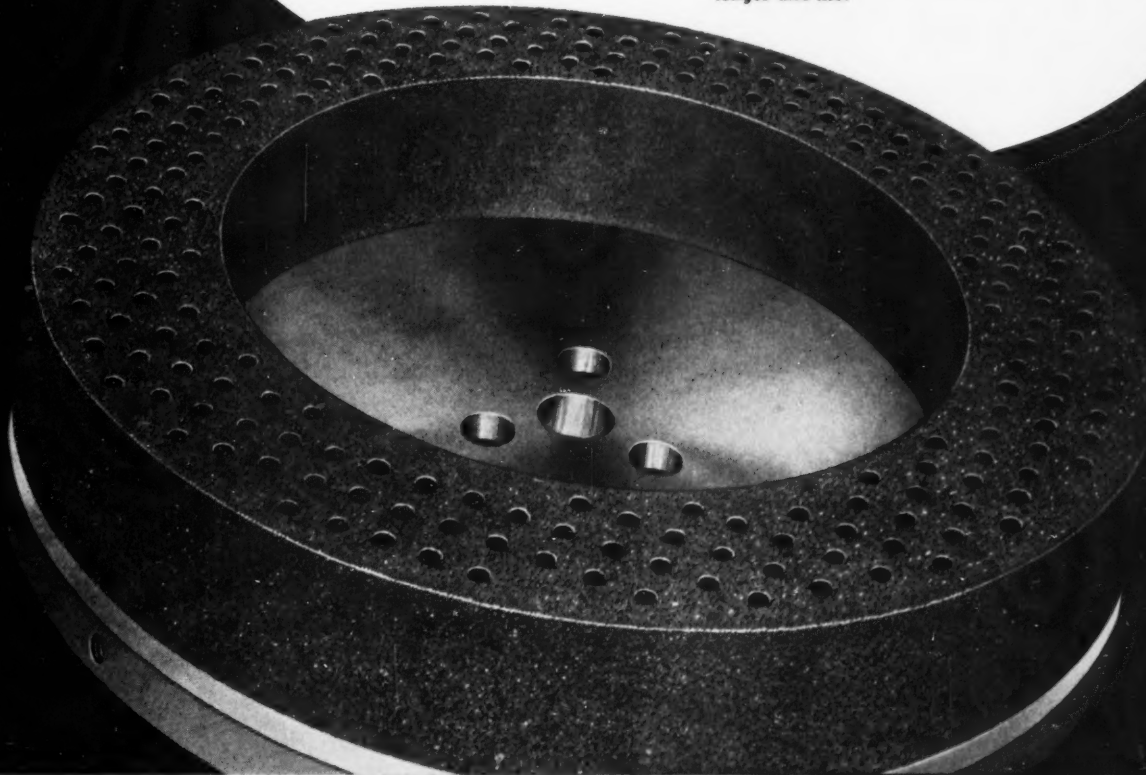
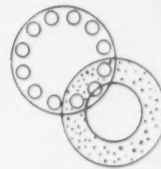
### **THE PROBLEM**

A double disc grinder with a rotary work carrying fixture was producing periodic inaccuracies in work. The abrasive disc continually built up a ridge around the center hole. Frequent dressing was necessary to hold tolerance. Production was low, abrasive life short.



### **THE SOLUTION**

Gardner Engineers located trouble in location of rotary work carrying fixture. Work pieces were not reaching center hole of disc, thus causing a ridge to form around center area. Problem was solved by furnishing discs with larger centers, permitting a portion of each work piece to pass into the center. Immediate results were fewer rejects, more production, longer disc life.



Gardner Abrasive Engineering offers experience derived from making both the grinding machines and the abrasive discs. It considers machine performance first and then evaluates how grade and grain of abrasive or type of disc affect grinding results. If standard abrasive discs won't do the job, discs are made *just for you*.

For help with your grinding problem, consult the Gardner Abrasive Engineer.

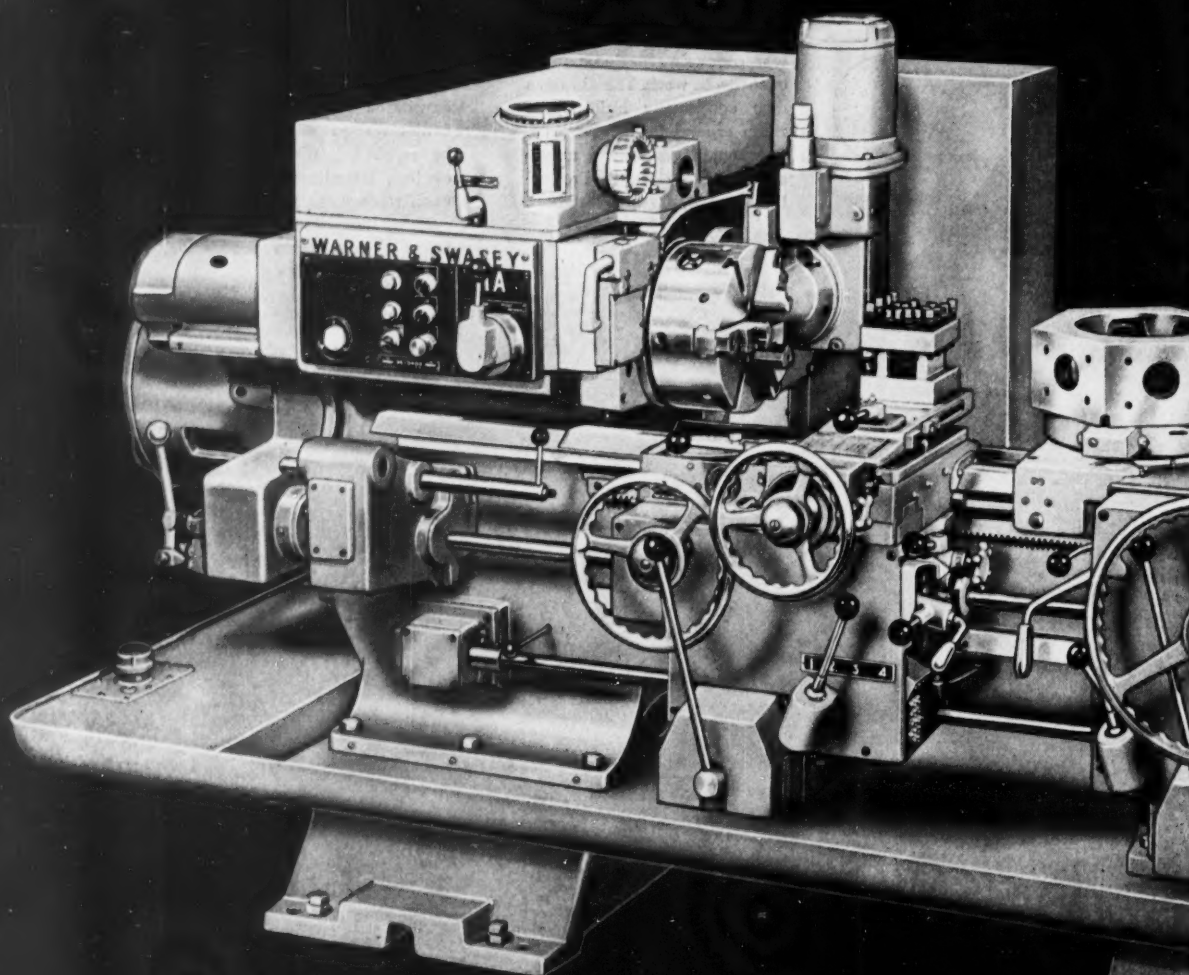
114A

**GARDNER MACHINE COMPANY**  
414 Gardner St., Beloit, Wisconsin, U.S.A.

# **GARDNER**

*abrasive  
discs*

# What do you want in



The entirely new line of Warner and Swasey Saddle Type Turret Lathes also includes new 2-A, 3-A, and 4-A models — all designed to anticipate your turning requirements for years to come.

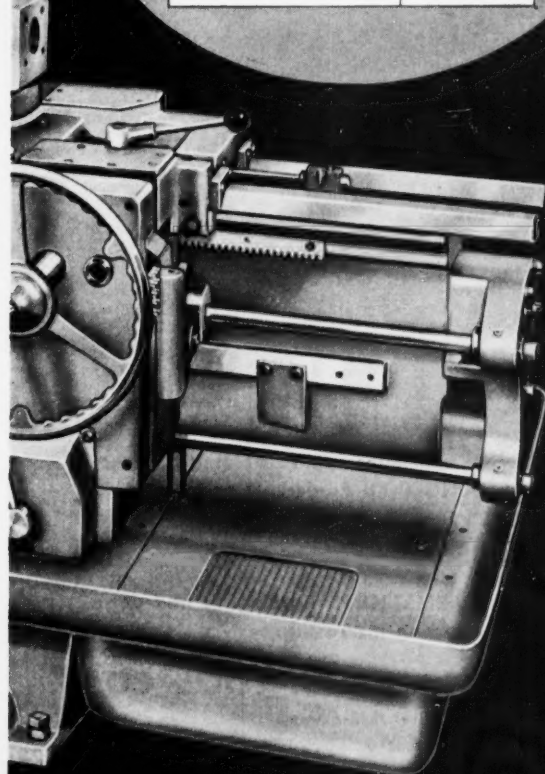
**YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &**



# ***TOMORROW'S*** turret lathe?

## **NEW WARNER & SWASEY 1-A UNIVERSAL HEAVY DUTY TURRET LATHE**

Chuck Capacity	16 1/4"
Bar Capacity	2 1/2" or 3"
Motor	30 hp



### **MORE USABLE CUTTING SPEEDS?**

***New Warner & Swasey 1-A has them!***

16 spindle speeds give you a closer grouping of speeds in the natural work range—to turn more work diameters at ideal speeds, increase production and tool life. And with a two-speed motor the 1-A gives you 32 un-duplicated speeds!

### **ABILITY TO TURN TO CLOSER LIMITS?**

***New Warner & Swasey 1-A has it!***

Scientific diagonal-rib-designed bed provides greater rigidity without additional weight. Self-aligning and induction hardened Vee bedways, protected by way covers, assure long accurate life. Positive locating and locking hex turret also gives you greater accuracy.

### **MORE POWER?**

***New Warner & Swasey 1-A has it!***

15 to 30 horsepower motors give you more than enough power for any job. They drive a unique, constant-mesh power train with direct-acting hydraulic clutches to handle all speed changes. Eliminates gear shifting completely.

### **SIMPLER OPERATING CONTROLS?**

***New Warner & Swasey 1-A has them!***

A single lever controls all speed changes—eliminates all gear shifting. Pre-selection of next speed simple with large indicator dial. *Zoned controls* for headstock and both apron units are grouped within easy reach—designed for easier, faster operation, less operator fatigue, increased production!

**WARNER  
&  
SWASEY**

*Cleveland*

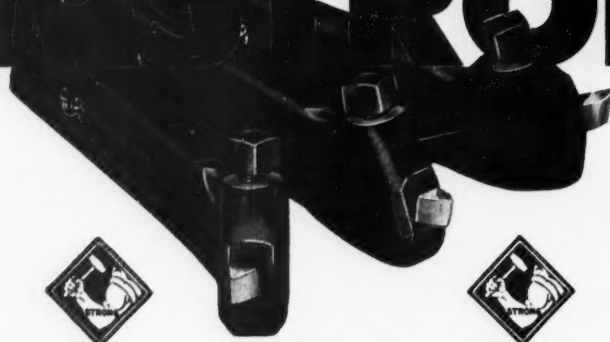
PRECISION  
MACHINERY  
SINCE 1880

**SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY**

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—25

# ARMSTRONG



**More Tools  
Per Man  
for  
More Profit**

Even when labor was cheap and tools were costly, it was the best tooled shops that prospered. Now, with wages higher and the work days shorter, it becomes imperative that every worker be supplied with every tool that will increase his hourly production.

See that each lathe, planer and shaper operator has the correct ARMSTRONG TOOL HOLDERS for each operation he performs. Equip each machine with its full complement of ARMSTRONG Setting-up Tools. Use better balanced, handier ARMSTRONG

WRENCHES on machines and assembly lines. Specify ARMSTRONG Drop Forged "C" Clamps and Lathe Dogs . . . Today, only quality tools can be truly economical.

Write for the ARMSTRONG Catalog. It has page after page of production-increasing, cost-cutting tools.

**ARMSTRONG BROS. TOOL CO.**

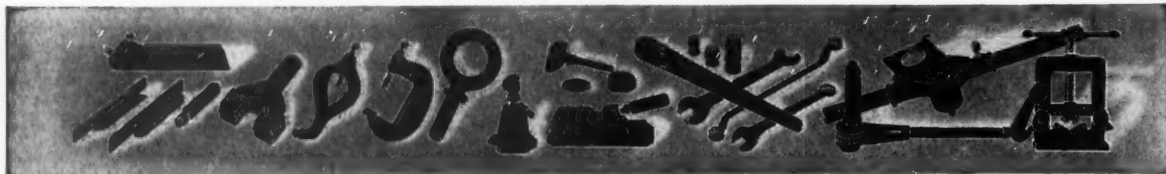
"The Tool Holder People"

5213 W. ARMSTRONG AVENUE

CHICAGO 30, U.S.A.

New York and San Francisco

*Armstrong Tools are Stocked by Industrial Distributors*





## ...Seen any lamplighters lately?

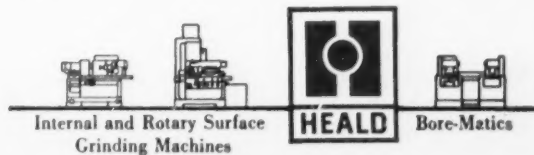
**T**HE lamplighter's job seemed pretty secure... until someone discovered how to light a lamp without a flame; turn it out at the flick of a switch. Then the lamplighter disappeared — but a whole new industry was born.

For competition is at work everywhere, constantly directing the shape of things to come. Products that are better or less costly forge ahead — others are left behind.

Today, with competition rising to a normal, healthy pitch, manufacturers everywhere are seeking new ways to improve production and cut costs. That's where we at Heald can help you. In the vital matter of precision finishing, new Heald machines and advanced Heald engineering can often effect substantial savings—improve production speed and

product quality too! Ask your Heald representative about the latest developments in automation, simultaneous and progressive borizing, improved grinding and loading methods.

Competition is wonderful if you're *ahead* of it. Our business is to help keep you there. That's why **IT PAYS TO COME TO HEALD.**



### THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton  
Detroit • Indianapolis • New York



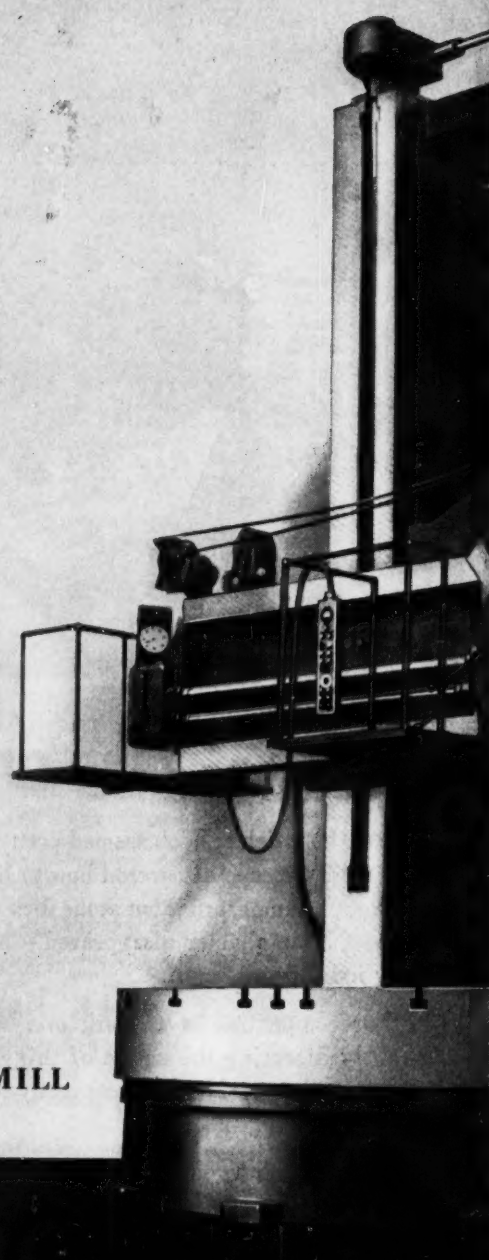
# *...another BIG one!*

Yes, it's a big one, but Consolidated builds them larger and also smaller.

But more than bigness is the quality of the engineering thinking that goes into Consolidated Machine Tools. For example, on this 20 Foot BETTS Vertical Boring Mill, there isn't a single gear shift lever on the entire machine! Gear changing and all other operating functions are performed 100% from the pendant switches at the cutting tools.

In Consolidated Machine Tools you get tomorrow's engineering today!

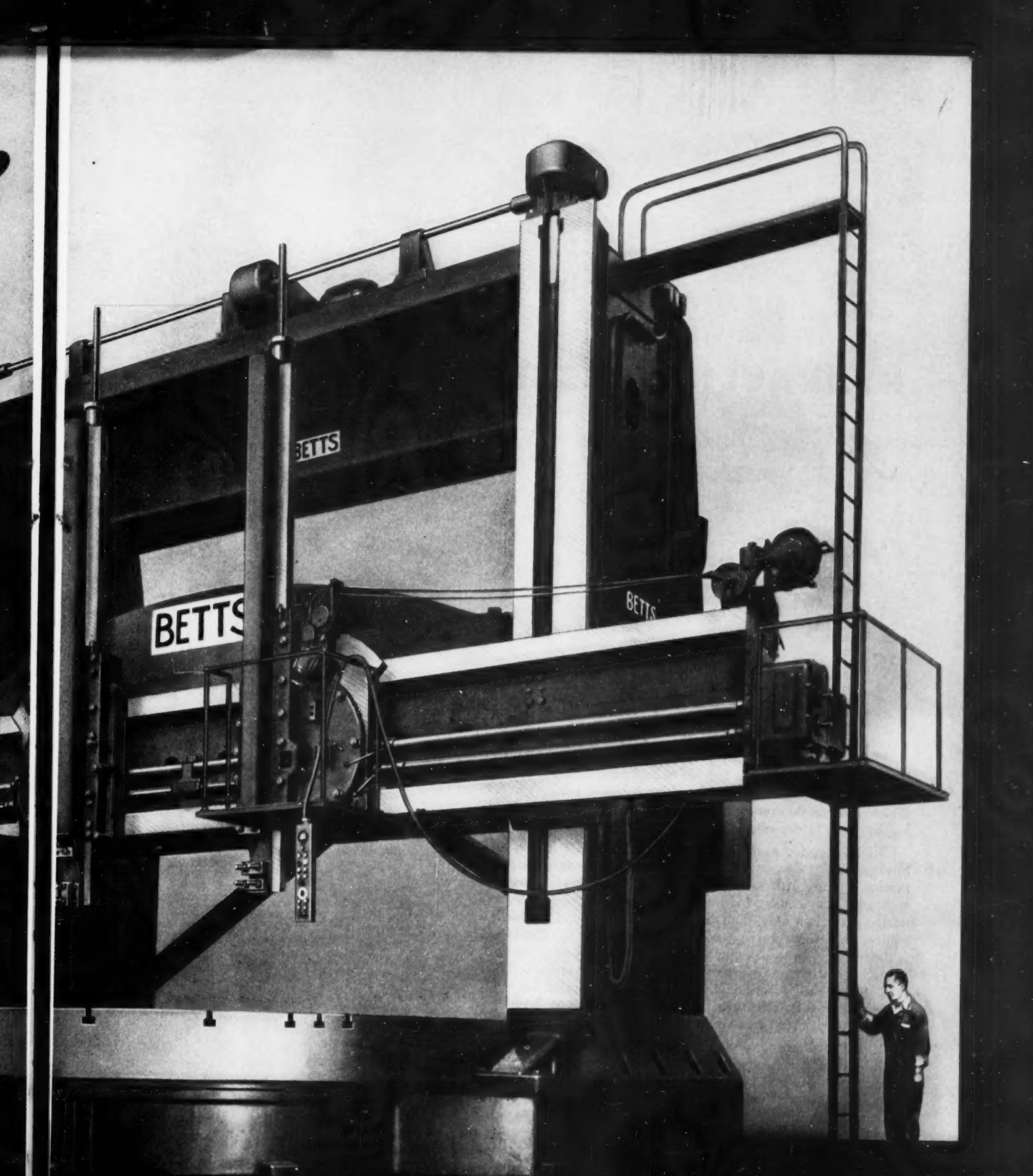
BETTS 20-FOOT  
VERTICAL BORING MILL



CONSOLIDATED MACHINE TOOL

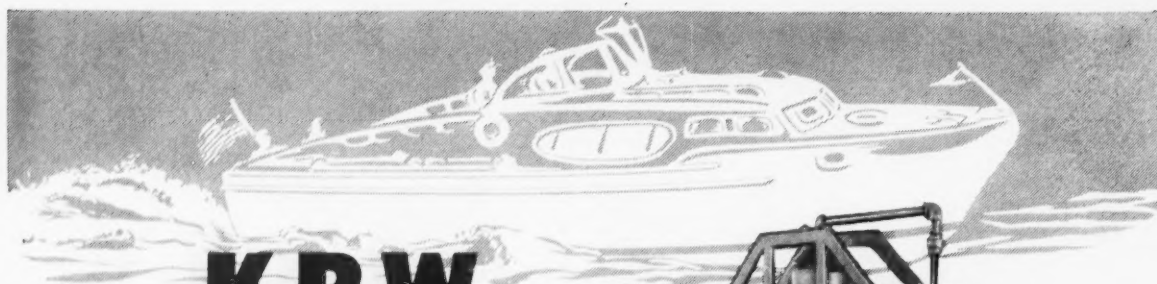
*Wholly owned subsidiary of Farrel-*





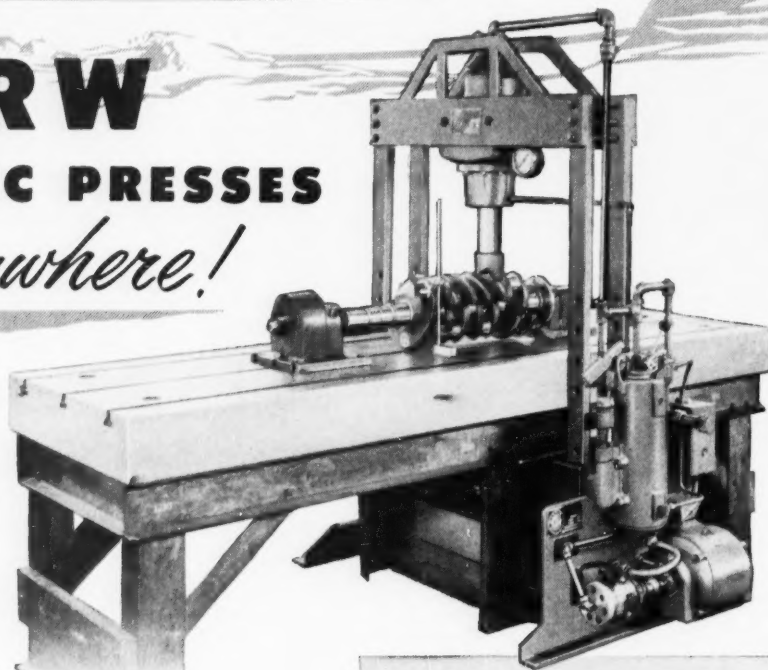
CORPORATION, ROCHESTER, N. Y.

*Birmingham Company, Incorporated*



## KRW HYDRAULIC PRESSES

*go everywhere!*



We've seen so many different uses for KRW Hydraulic Presses in so many different plants that we're beginning to think they can tackle just about any metalworking job that comes along. We've seen 'em do everything from simple straightening and bending jobs to compressing wispy lace threads on bobbins.

This Press, for example, is one of three in the factory of Sterling Engine Co., one of America's foremost manufacturers of marine engines. It is a 75 ton, motor-driven Hydraulic Press with a specially constructed bed for handling long pieces. Shown on the press is a crankshaft from a 4-cylinder diesel marine engine. Sometimes warpage occurs in cooling and the crankshaft is then rotated between centers on the press and checked with a special dial gauge to determine if it's "out of round". Then it is straightened accordingly. This press is also used for straightening 6 ft. camshafts, pressing on rocker arm bushings, pressing bearings in gears and straightening 8 ft. aircraft spars.

If you need a fast, versatile, accurate Hydraulic Press in your plant — one that converts in seconds from one set-up to another, give us a call. We make a full line of one, two and three cylinder Hydraulic Presses; 25-150 ton capacities; hand, air or motor driven. Write for complete specifications and prices or see your machinery dealer.

### Only KRW gives you all this:

- Heavy Construction Throughout. Bed and Crown Members Truss reinforced for Added Stiffness and Strength. A KRW Exclusive Feature.
- Required Tonnage Pressure up to Rated Capacity can be Obtained Quickly and Selected Pressure Locked for Repetitive Operations.
- One Swinging Ball Arm Controls Motion of Ram Downward, Holds Pressure on Work, or Returns Ram.
- Excellent "Inching" of Ram Because Motor Runs Only When Operator Moves Ball Arm for Downward Ram Travel.
- Spring Return of Ram Gives Maximum Speed on Up-Stroke.
- Highest Quality Radial Type Hydraulic Pump.
- Direct Connected Motor Drive Through Flexible Coupling.
- Two Speed Hand Pump also Furnished on Motor Driven Presses in this series.

# K·R·WILSON

213 Mill Street, Arcade, N. Y.

Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!





## Important Discovery Made in Scientific Tests of CIMCOOL

Actual scientific laboratory and shop tests prove—*beyond doubt*—that CIMCOOL® with "95-59" eliminates rancidity and is positively non-irritating to the skin!

Operators say this radically new and different coolant—this *chemical emulsion*—is the biggest working improvement in years. The amazing ingredient "95-59" is a more effective bactericide, is non-corrosive and eliminates rancidity and foul odors—even in the hottest weather.

That's why plant after plant reports that CIMCOOL, in contrast with old-fashioned cutting fluids, can be kept at work longer.

Thus, CIMCOOL greatly reduces downtime and labor costs for cleaning and changing.

Why not prove to yourself what scientific tests and on-the-job experience have already proved. Put CIMCOOL to the test in your own machines. For a demonstration, just write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

\*Trade Mark Reg. U.S. Pat. Off.

# CIMCOOL

**for 85%**  
of all metal cutting jobs

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.





**VK** HIGH SPEED STEEL

# THREAD MEASURING WIRES

...basic tools  
in a universally  
accepted method  
of checking  
screw  
threads

VK Set No. 20 HS Thread Measuring Wires, accurate to  $\pm .000025''$  for 20 common pitch Unified and American screw threads, 6 to 36 threads per inch.

The Van Keuren Catalog and Handbook No. 35 contains 91 pages of technical and engineering information on wire measurement of screw threads. This information, compiled from many years' research in the field, is available without charge by addressing: The Van Keuren Co., 178 Waltham Street, Watertown, Mass.

The three-wire method is probably the best known and most widely accepted system of measuring pitch diameter of screw threads. Equipment required includes only a set of VK Thread Measuring Wires of proper diameter and an accurate measuring instrument.

Van Keuren Thread Measuring Wires have been developed over a period of many years of pioneering in the precise measurement field. They are made to National Bureau of Standards specifications, are held within  $.00002''$  for roundness, straightness and identity and to within  $.000025''$  of exact size.

VK Thread Measuring Wires are made of long-wearing, tough and beautifully finished high speed steel and are either  $1\frac{7}{8}''$  or  $2''$  in length. Every wire is subjected to the closest criteria in today's standards of accuracy.

In addition to set No. 20, shown here, VK furnishes many other standard sets as well as special wires in diameters from  $.001''$  to  $1.500''$ .



THE *Van Keuren* co.,  
178 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carbide Cemented Carbide Plug Gages • Carbide Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages





# FACTORY-EQUIPPED WITH



A line-up of punch presses on the shipping floor of Julius Blum & Co., Carlstadt, N. J., all factory-equipped with A-B controls.

Machinery builders find the new 6th Edition, 120-page Handy Catalog a helpful guide in selecting motor controls for any machine. Let us send you a copy.

Allen-Bradley Co.  
1316 S. Second St., Milwaukee 4, Wisconsin



**THE ALLEN-BRADLEY**  
*Trademark-*

**is a Guarantee of  
Trouble-free Motor Control  
and a Plus Value in Machine Tool Sales**

If you make motor-driven machines... which are sold "factory-equipped" with motors and controls... you assume over-all responsibility for, and can guarantee, the satisfactory operation of the whole machine. This fact can be converted into a powerful sales asset. By featuring Allen-Bradley controls on your machines, you provide assurance that the controls are of the best. Allen-Bradley starters, relays, and contactors have an established reputation for long, trouble-free life... they are good for millions of switching operations.

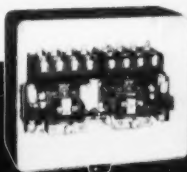
**Allen-Bradley Size 1 Motor Controls—Rated 5 hp, 220 v; 7½ hp, 440-550 v.**



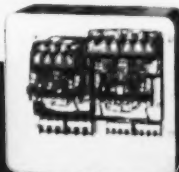
Manual  
Starter



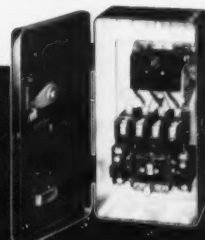
Automatic  
Starter



Reversing  
Starter



Multispeed  
Starter



Combination  
Starter

5-54-R

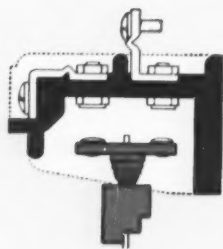


**ALLEN-BRADLEY**  
SOLENOID MOTOR CONTROLS  
QUALITY

# Bulletin 709 Starters are SO TROUBLE FREE

... .. *because they are* SO SIMPLE

## DOUBLE BREAK, SILVER ALLOY CONTACTS—NO MAINTENANCE

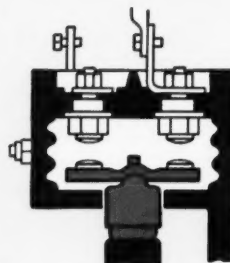


SIZES 0 & 1

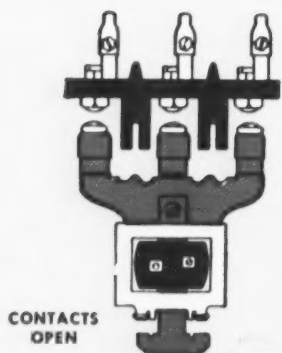
Some 20 years ago, when Allen-Bradley announced the new Bulletin 709 solenoid starter, a big feature was the change from single break, copper-to-copper contacts to double break, silver alloy contacts. A warning on the name plate said: DO NOT FILE, CLEAN, OR DRESS CONTACTS.



At first, maintenance electricians paid little attention to this request. Who had ever heard of running motor starters without contact maintenance? But, today, the dependability of Allen-Bradley starters is taken for granted. They have proved they are good for millions of trouble-free switching operations.



SIZES 2 TO 7



CONTACTS OPEN

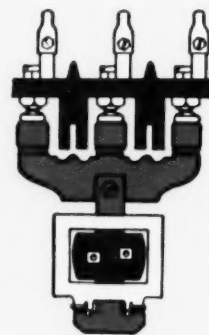
## ONLY ONE MOVING PART—NOTHING TO RUST AND STICK

The Allen-Bradley solenoid starter design was new and revolutionary in 1934. By doing away with clapper contactors, it eliminated hinged linkages, pivots, pins, and bearings. Only one moving part... the one-piece solenoid plunger... opens and closes the contacts with a simple up-and-down motion. Such simplicity assures unfailing operation.



Today, millions of Allen-Bradley solenoid relays, contactors, and switches are in active use. They have set a standard of performance which has expanded the use of automatic controls.

Allen-Bradley solenoid controls sustain almost unbelievable production records. Look for the A-B trademark. It means QUALITY in motor control.



CONTACTS CLOSED



Under the same operating conditions a machine with many moving parts is more likely to develop trouble than a simpler machine with fewer moving parts.

The same rule holds true for motor starters. Most starters have complicated linkages, bearings, hinges, pins, and pivots in their mechanisms. Each moving part is a potential troublemaker.

Allen-Bradley Bulletin 709 magnetic starters are SIMPLE—they have ONLY ONE MOVING PART. If you want maintenance free motor controls... specify Allen-Bradley. Let us send you the latest A-B information—the A-B Handy Catalog.

Allen-Bradley Co.  
1316 S. Second St., Milwaukee 4, Wis.

Bulletin 709 starters: Sizes 0 to 4.  
Sizes 5 to 7 not shown.

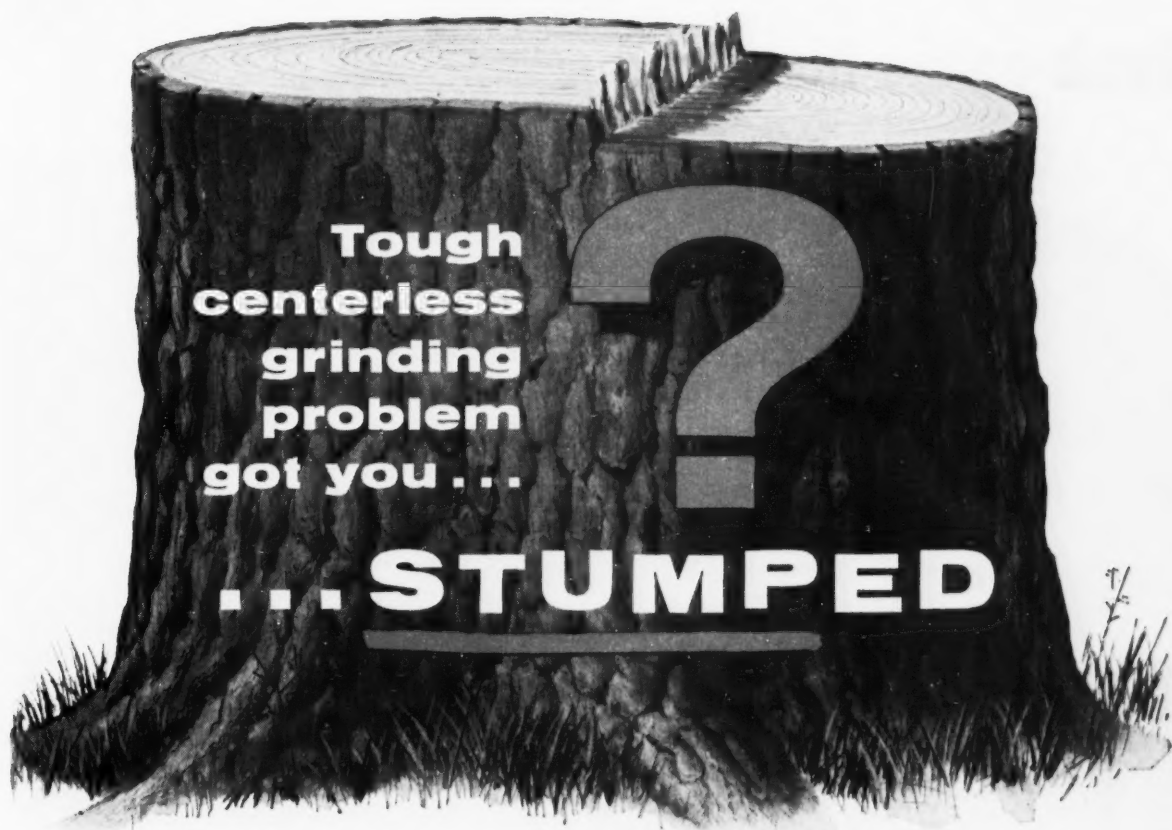
Max Rating: 300 hp, 220v; 600 hp, 440-550v.

# ALLEN-BRADLEY

TROUBLE-FREE MOTOR CONTROLS

QUALITY





Here's the  
grinding wheel that will  
**ABSOLUTELY** solve it!

CINCINNATI Grinding Wheels can help you solve that tough centerless grinding problem . . . because CINCINNATI Wheels are made to team-up with centerless grinders. And with a Cincinnati Milling-trained machinist on the spot to help you get to the root of the problem, you can count on the *right answer*—FAST! Here's why:

**1** We've solved hundreds of centerless grinding problems involving high stock removal, good finish, accurate sizing, and high production per dressing, by using the right CINCINNATI Wheels.

**2** CINCINNATI Grinding Wheels were developed by Cincinnati Milling, which, in the field of centerless grinders, has done more research, had more experience and made more machines than any other organization in the world.

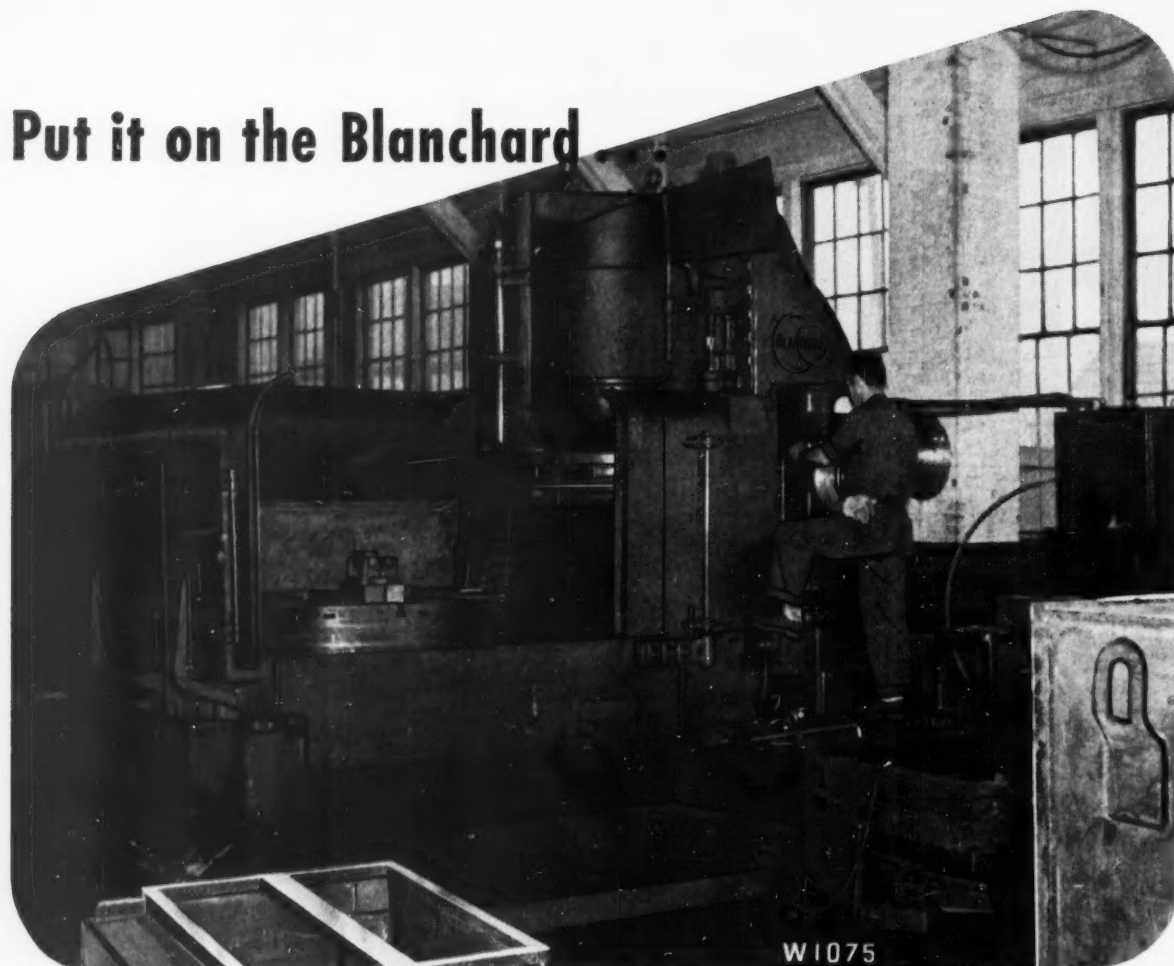
**3** CINCINNATI Grinding Wheels are based on an entirely new approach to grinding wheels, the development of the grinding wheel as a true cutting tool, and they represent twenty-five years of Cincinnati Milling research and practical experience.

We are so confident—so *absolutely sure*—that CINCINNATI Grinding Wheels can help you that we make this *unconditional* offer: Either you must be completely satisfied, or we will issue full credit for the CINCINNATI Grinding Wheel used.

So contact us at once. We'll send one of our Cincinnati Milling-trained machinists to show you how to get the most out of CINCINNATI Grinding Wheels. There is no charge for his service. Write, wire or phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



# Put it on the Blanchard



*it takes  $\frac{1}{5}$ <sup>th</sup> the time!*

Here is another example of the special jobs  
Blanchard Surface Grinders perform  
*in less time*, to exacting specifications.

These explosion-proof control cases are used in the coal  
mining industry. Each steel weldment case is 36" x 48" x 24" deep.

Because gaskets cannot be used, surface finish, and flatness must provide a  
dust and gas explosion-proof metal seal.

A Blanchard Surface Grinder, the No. 32-60, removes approximately  $\frac{1}{8}$ " of stock — in *one-fifth*  
the machining time formerly required.

*Send a sampling of your parts for free test grinding and our recommendations.*

**PUT IT ON THE BLANCHARD**

**THE BLANCHARD MACHINE COMPANY**

**64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

36—MACHINERY, June, 1954

For more information on products advertised, use Inquiry Card, page 245

Send for your free copies of  
"Work Done on the Blanchard",  
fourth edition, and "Art of  
Blanchard Surface Grinding".





**SMOOTH**

**QUIET**

**TOUGH**

Metallurgical control at Axelson is one of the important keys to Axelson lathe quality. Take the headstock gear, for example. Heavy alloy steel, case-hardened the way Axelson does it, assures high resistance to wear, to shock and to surface pitting. Other hardened lathe parts include headstock shafts, headstock and tailstock spindles and carriage bedways. This is one important reason why Axelson lathes are both rugged and accurate—why they maintain their precision for long periods even under the heaviest work load. Axelson is the master of meticulous detail. Below, a few of the check points in the Metallurgy Department.

## AXELSON LATHES

*Hardness Testing*



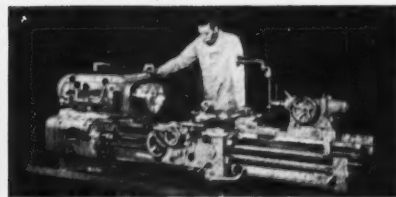
*Micro-Structure Studies of Metals*



*Case Hardening*



*Carbon Content Analysis*



*16" Precision Tool Room Lathe*

AXELSON  
MANUFACTURING COMPANY DIVISION  
PRESSED STEEL CAR COMPANY, INC.  
LOS ANGELES 58, ST. LOUIS 16, NEW YORK 7, TULSA 1

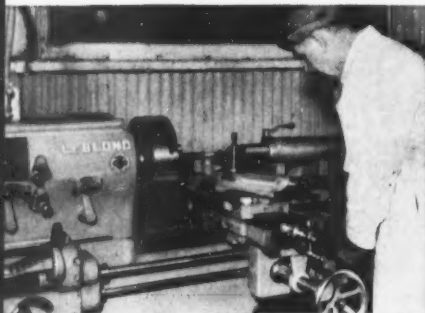
RAILROAD FREIGHT CARS • STANDARD PARTS  
DAIRY & FARM EQUIPMENT • WASTE CONTAINERS  
STAINLESS STEEL COOKWARE • CAR ACCESSORIES  
TANKS • AGITATORS • SMOKE STACKS • DUST  
COLLECTORS • COAL & ASH HOPPERS • FITTINGS & ELECTRICAL  
ACCESSORIES • ORDINANCE MATERIAL • UNISELTER RELOCATABLE  
MOWERS • EXPORT CRUISE, LOCOMOTIVES & TRACKWORK • CARS  
(MINE, ORE, CARGO, INSPECTION) • UNISTRUT METAL FRAMING  
WEED BURNERS • BRICK & TILE MACHINERY • CANE LOADERS



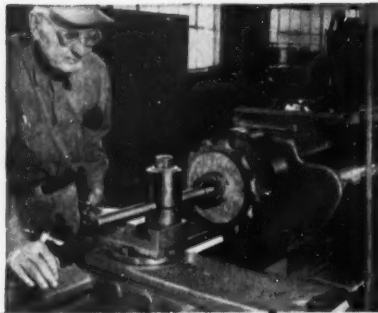
LATHES • ENGINE • TOOL ROOM • HOLLOW SPINDLE  
GAP BED • PETROLEUM PUMPING EQUIPMENT  
DEEP WELL PLUMBER PUMPS • DRUCK RIGS • HY-  
DRAULIC PUMPING UNITS • AIRCRAFT COMPRESSORS

# Versatile LeBlond Lathes Knock Down

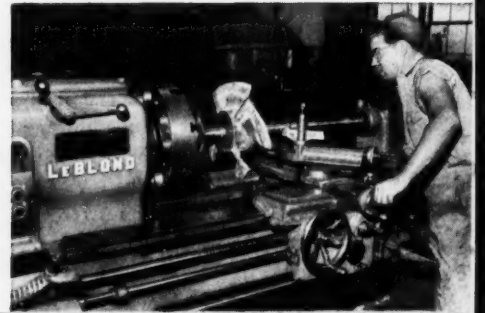
In Chicago, Ill., LeBlond 16" Heavy Duty Engine Lathe finishes 12" steel blank for roller die used in cold roll forming mill at U.S.G.'s Hermosa Plant. Machine does wide variety of maintenance jobs—same day was used to thread slitter arbor for an expanded metal lath machine. T. F. Heneghan, Engineering Supt., says LeBlond Lathe gives U.S.G. "faster maintenance". Ask for Bulletin HD-125-A.



In Norfolk, Va. versatile LeBlond 19" Regal Gap Lathe recuts welded boot scraper shaft. Exacting precision is number one requirement here. Note removable bed section is in place on this job, can be removed to accommodate work up to 27 1/4" diameter. Ask for Bulletin R-PG-1-A.



In Ft. Dodge, Iowa, LeBlond 17" Regal Lathe bores sprocket to  $\pm .001$ ". Sprocket must fit bearing shaft also turned on the LeBlond. Plant Engineer, John F. Hoertz, says, "This lathe holds tolerances better than previous lathes, saves tool life, speeds up maintenance work . . .". Ask for Bulletin R-135-A.



In Greenville, Miss., LeBlond 16" Heavy Duty Engine Lathe dresses down shaft for flume return pump, part of the water return system at U.S.G.'s Pressed Board Plant. Other jobs include machining precision bearings for Pelton pump, turning down built-up bushing on universal joint for a steam press—typical of the great variety of turning work now done in U.S.G.'s own shops. Many used to be jobbed out—cost extra time and money. Ask for Bulletin HD-125-A.

# "Upkeep" Costs for U.S. Gypsum

*16 U.S.G. Plants from Maine to California*

*depend on LeBlonds for speedy, economical maintenance.*

Dozens of turning jobs that used to be "farmed out" by U.S. Gypsum Plants now get done at less cost and *days sooner*, right in U.S.G.'s own maintenance shops—thanks to versatile LeBlond Lathes.

With U.S.G.'s quarry-to-finished-product operation, plant machinery ranges from huge mining equipment—to processing machinery—to speedy conveyors—to intricate packaging machines that bundle up finished products. Who knows what the LeBlond's next "fix-it" turning job will be? Today it's dressing down the shaft of a flume return pump. Tomorrow it's finishing a precision bearing where the critical tolerance goes down to tenths!

Convenience, low cost, dependability, wide variety of work—that's what LeBlond Lathes mean to maintenance

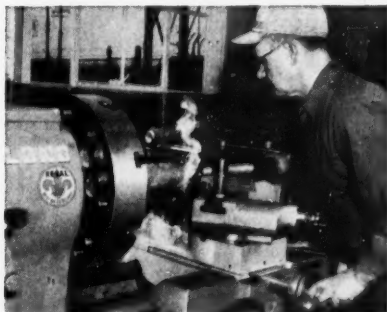
men at U.S. Gypsum. And that's why there's at least one LeBlond Lathe on maintenance work in each of 16 U.S.G. Plants—from Maine to California.

How many of *your* turning jobs did you send out of your plant this month? Is the "other fellow's" profit a large chunk of your maintenance cost?

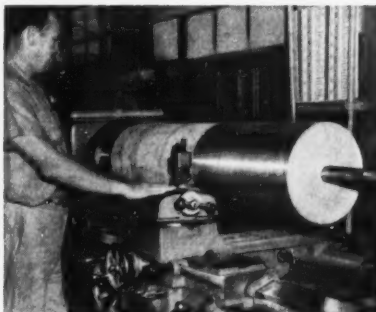
Call your nearby LeBlond Distributor. Show him the variety of turning work that your maintenance requires. Tell him how long it takes to get it done elsewhere, what it costs. From LeBlond's complete line of 76 different lathe models, he can recommend lathes that will handle all of it—or at least a major portion. You'll get the work done sooner, dependably, and without an outsider's profit to pay for.

*For complete information contact your LeBlond distributor or write—*

**THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO**



**In Alabaster, Mich.,** LeBlond 24" Regal Lathe threads take-up bolt for 4½ yard Bucyrus-Erie Rock Shovel. Four threads per inch, speed 95 rpm. Plant Engineer, E. John Minderman, says this LeBlond Lathe handles work ranging "from very small parts found in electrical and hydraulic equipment to large gears, shafts and armatures that require the full capacity of the machine". Reports "very dependable service". Ask for Bulletin R-163-A.

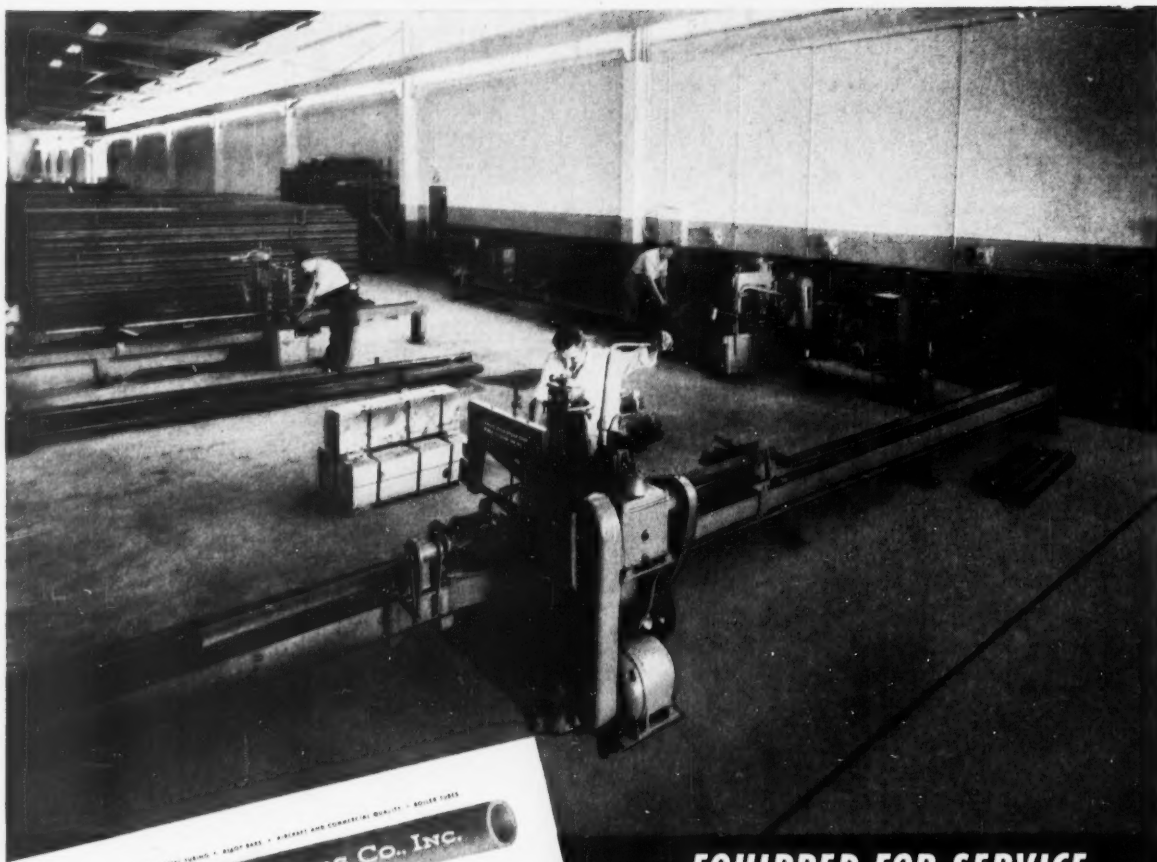


**In Plaster City, Calif.,** U.S.G. saves at least seven days by machining this roller on the LeBlond 20" Standard Duty Engine Lathe—right in their own shop. Job used to be sent out, took up to ten days to complete. Another LeBlond Lathe is still in regular use at the Plaster City Plant, after over 25 years of maintenance work. Plant Engineer, R. W. Langewisch, says LeBlond Lathes "save time, expense, increase shop capacity". Ask for Bulletin SD-250-A.



*World's largest builder of a  
Complete Line of Lathes—  
for More than 66 Years.*





**TUBE DISTRIBUTORS CO., INC.**  
GARDEN CITY, NEW YORK  
GARDEN CITY 2 3092



Armstrong-Blum Mfg. Company  
5700 Bloomingdale Avenue  
Chicago 39, Illinois

Gentlemen:

We thought you would be interested in the enclosed photograph showing three of your No. 9A High Speed Hack Saws in action in our new 50,000 sq. ft. warehouse in Garden City, New York.

These Marvel Automatic High Speed Saws perform to our complete satisfaction, and enable us to cut steel tubing and bars to required lengths very economically. Labor and blade costs also are kept to a minimum.

Your prompt and efficient attention to our requirements in the past is very much appreciated, and we look forward to many more years of pleasant relationship.

Sincerely yours,

TUBE DISTRIBUTORS CO., INC.

*Charles Davis*  
Charles Davis  
Asst. Superintendent

CD:br

## EQUIPPED FOR SERVICE

With the three No. 9A Marvel Heavy-duty Production Saws shown above in their new warehouse, the Tube Distributors Co., Inc. are equipped to give prompt service on single lengths or any quantities of identical pieces for these are the world's fastest, accurate cutting-off machines.

Operating at higher speeds and heavier feeds with blades tensioned tauter than ordinary saws, these saws will cut off accurately identical lengths from single or nested tubes or bars automatically with no more operator attention than an automatic screw machine. Still, at any point in a "production run", the automatic bar-push-up can be disengaged with the throw of a lever, a miscellaneous cut made, and the "production run" resumed.

Write for Marvel Catalog  
9 types of metal-cutting saws,  
capacities 4" x 4" to 24" x 24"



**MARVEL** *Metal Cutting*  
**SAWS**  
Better Machines—Better Blades

**ARMSTRONG-BLUM MFG. CO. 5700 Bloomingdale Avenue • Chicago 39, Illinois**





## “Dependable performance...matchless service —that's why our pressroom is 96% BLISS”

*says Ben Suckle, President of Suckle Electronics Co., one of the largest custom sheet metal fabricators for the electronics industry.*

The tail wags the dog in this modern-day Horatio Alger story:

Back in 1946, Suckle Electronics Company, a consulting firm specializing in radio and television engineering, decided to broaden the base of its business by entering the contract stamping business in a limited way.

The sky, though, turned out to be the limit. For today, a scant seven years later, Suckle Electronics Company is one of the largest custom sheet metal fabricators supplying the electronics industry.

"In our first year," says Ben Suckle, "a lack of capital forced us to build up our pressroom with second-hand equipment. We realized, however, that

to meet the quick delivery demands of the electronics industry a dependable pressroom is a must. In 1948, we ordered our first new press—a Bliss. We quickly added more, and now there are 40. We standardized on Bliss because our experience proved that the Bliss presses can take our 96-hour-a-week operation, since Bliss replacement parts are truly interchangeable without machining or hand-fitting, and because engineering and other services offered by Bliss are eminently satisfactory."

If, like Suckle Electronics, you're looking for dependability in your pressroom, call a Bliss engineer. He will be glad to help you pick the proper press for your operation.



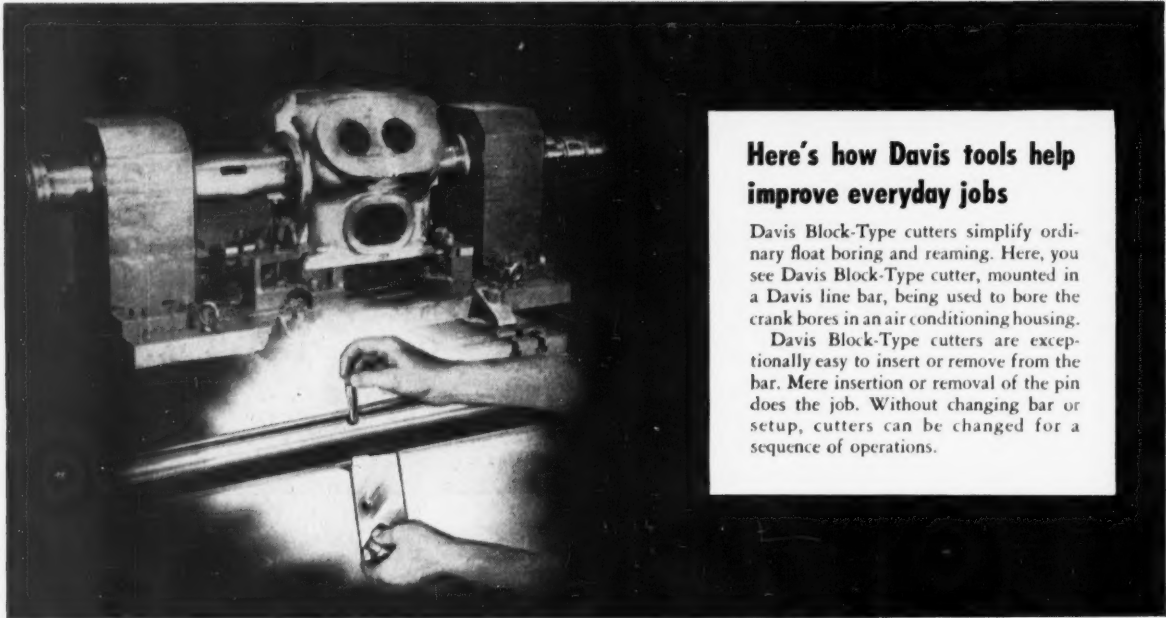
**on your press is more than a name...it's a guarantee**

**E. W. BLISS COMPANY, Canton, Ohio**

**PRESSES, ROLLING MILLS, SPECIAL MACHINERY**

**Subsidiary: The Die Supply Company, Cleveland, O. • E. W. Bliss (England) Ltd., Derby • E. W. Bliss Company (Paris) France**  
**U. S. Plants in Canton, Salem and Toledo, Ohio; Hastings, Michigan; and San Jose, Calif. Branch Offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. West Coast Representatives: Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. Other representatives throughout the world.**

# ROUTINE BORING: If there's a better way to do it, DAVIS will know it!

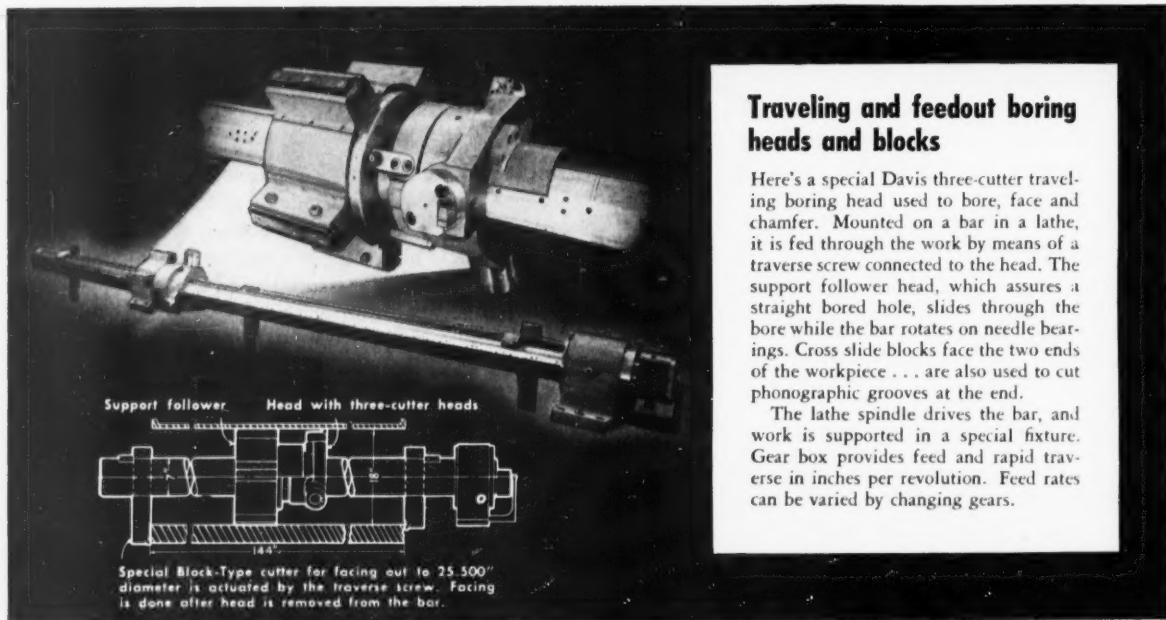


## Here's how Davis tools help improve everyday jobs

Davis Block-Type cutters simplify ordinary float boring and reaming. Here, you see Davis Block-Type cutter, mounted in a Davis line bar, being used to bore the crank bores in an air conditioning housing.

Davis Block-Type cutters are exceptionally easy to insert or remove from the bar. Mere insertion or removal of the pin does the job. Without changing bar or setup, cutters can be changed for a sequence of operations.

# EXTRAORDINARY BORING: If DAVIS can't bore it, it can't be done!



## Traveling and feedout boring heads and blocks

Here's a special Davis three-cutter traveling boring head used to bore, face and chamfer. Mounted on a bar in a lathe, it is fed through the work by means of a traverse screw connected to the head. The support follower head, which assures a straight bored hole, slides through the bore while the bar rotates on needle bearings. Cross slide blocks face the two ends of the workpiece . . . are also used to cut phonographic grooves at the end.

The lathe spindle drives the bar, and work is supported in a special fixture. Gear box provides feed and rapid traverse in inches per revolution. Feed rates can be varied by changing gears.

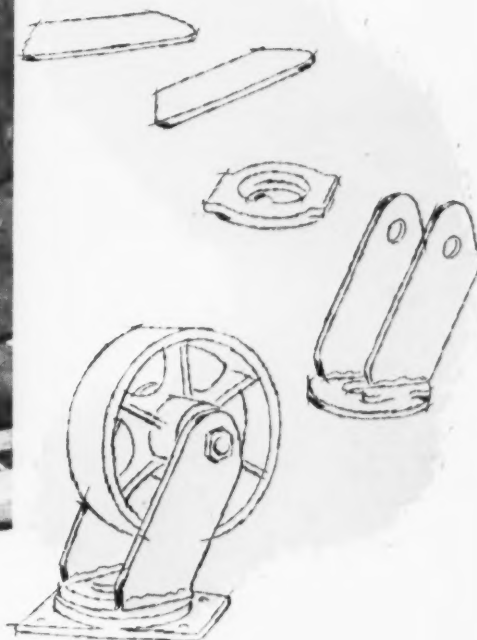
## What's your boring problem?

Davis makes a complete line of interchangeable block-type cutters, boring heads, boring bars, super-micrometer fly-cutter tools, L-type micrometer boring tools, special boring tools and accessories. Offers you a complete tooling service to solve any routine or extraordinary boring problems. Get the facts now. Write for the new Davis Catalog 304.



**DAVIS**  
**BORING TOOL DIVISION**  
OF GIDDINGS & LEWIS MACHINE TOOL CO.  
FOND DU LAC, WISCONSIN





## SIGMA WELDING BOOSTS STEEL FABRICATION 100%

- 
- 
- 
- 
- A manufacturer of steel truck
- casters, has doubled his production
- from 400 to 800 units a day—
- by changing to sigma welding.

**Average welding speed is 120 in. per minute**—Once clamped, the parts are welded in less than  $\frac{1}{2}$  minute.


**Used as welded**—Free from spatter and flux entrapment, the need for finishing is eliminated.

**Cut costs**—Fewer production steps have made possible labor savings up to  $\frac{1}{2}$  the former costs.

Sigma welding is just one of the welding processes developed by LINDE's research and years of experience. HELIARC,

sigma, and UNIONMELT welding form a top notch fabricating team which is now setting a new peak in industrial production. For small shops or huge production lines, from carbon steel to complex alloys and non-ferrous metals—there is a LINDE electric welding process to do the job efficiently and economically. Your local Linde representative will help you determine the best welding process for your job. Call him today for more information.

### LINDE AIR PRODUCTS COMPANY

A Division of Union Carbide and Carbon Corporation  
30 East 42nd Street  New York 17, N. Y.  
Offices in Principal Cities

In Canada: DOMINION OXYGEN COMPANY  
Division of Union Carbide Canada Limited

*Linde*  
TRADE-MARK

"Heliarc," "Unionmelt" and "Linde" are registered trade-marks of Union Carbide and Carbon Corporation.

For more information on these products, use Inquiry Card, page 245

MACHINERY, June, 1954—43



Oil Shale Demonstration Plant, Rife, Colorado

Shostal Press Agency Photo

**BULLARD**

**The  
Invisible  
Background  
of  
Industrial  
Progress**

In 1850 the bulk of work was done by men and draft animals. Only a little more than six per cent of all the energy used in the United States was used by machines. Lacking good lubricants, the machines available were subject to frequent breakdowns. The discovery of oil in 1859 made possible the development of high-speed steam-driven engines and internal combustion engines. As a result, our use of mechanical energy has multiplied 250 fold in nine and a half decades, and now does 90 per cent of the work in this country.

Modern plants, which produce this vital oil, require equipment which is manufactured with *Modern Machine Tools* — another illustration of "The Invisible Background of Industrial Progress."

**THE BULLARD COMPANY • BRIDGEPORT 2, CONNECTICUT**





### **Bullard Spacer**

*Available in two sizes,  
30" x 20" and 4" x 4"*

The experience of the Lockheed Aircraft Corporation, Burbank, California, shows the following manufacturing advantages offered by the Bullard Spacer in fabricating a cast aluminum support for the P2 V5 Neptune Anti-Submarine Aircraft.

Automatic spacing

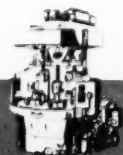
Reduction of set-up time

Greater accuracy — fewer rejects

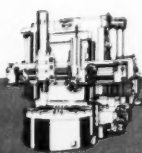
Elimination of jigs and related costs

Simplified tooling — lower maintenance costs

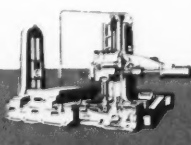
These factors can be applied to your manufacturing process where accurate and precise drilling, reaming or tapping to exacting standards is required. A Bullard Representative will gladly give you the complete Bullard Spacer story — call him, or write to The Bullard Company, Bridgeport 2, Connecticut — phone 6-2511.



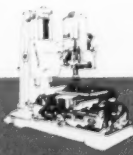
CONTIN-U-MATIC



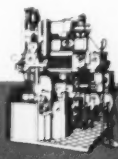
CUT MASTER



HORIZONTAL BORING



SPACER



MAN-AU-TROL



MULTI-AU-MATIC

**BULLARD**

**universally  
acclaimed!  
the *New* CP  
universal  
electric  
impact wrench**



Here's a Universal Electric Impact Wrench that can really get itself into tight spots! And its powerful impact action, developing 2,000 blows per minute, runs nuts and screws or drills and taps easier, faster and with far less effort! It's the speedy  $\frac{3}{8}$ " bolt size capacity CP-903R with its bonus capacity rating of  $\frac{5}{8}$ ".

Purposely designed with a slim profile for those awkward spot jobs, the wrench's nose section measures only 2" in diameter. Handy snap switch on the handle prevents reversing while wrench is running... affords simple one-hand operation. Pistol grip handle is centered at exact point of balance for effortless handling. And the CP motor is "unitized" for vibration resistance... affords long, maintenance-free service life. Write *Chicago Pneumatic Tool Company, 8 E. 44th St., N. Y. 17, N. Y.*

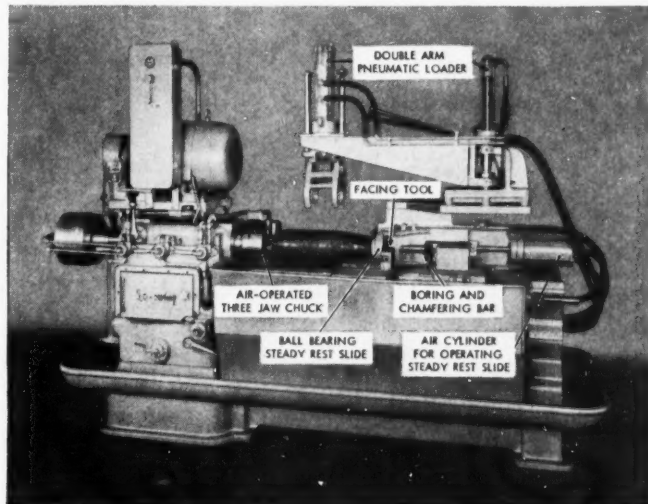


**Chicago Pneumatic**

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



## MODEL LR Lo-swing LATHE, BORES, FACES AND CHAMFERS OPEN END OF 155mm SHELL AT LOW COST

**PROBLEM:** To rough and finish bore, face and chamfer thread diameter of 155mm shells automatically.

**SOLUTION:** The Model LR Automatic Lo-swing Lathe selected for this job was equipped with a pneumatically-operated, three-jaw chuck for holding and driving the shells from the boat tail end. The opposite end is supported with a cone-shaped, ball-bearing rest mounted in a special heavy duty fixture which replaces the standard tailstock. The revolving rest is built into a sliding member which is operated by a large air cylinder, controlled by a hand valve. The construction of the revolving rest is shown in the line illustration.

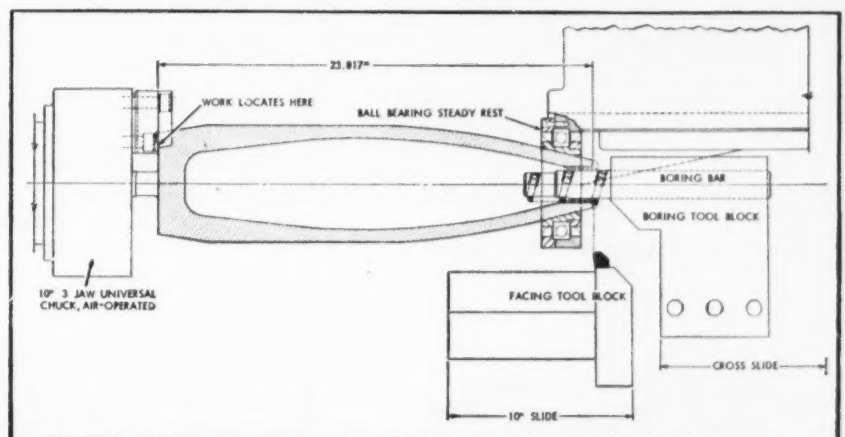
The lathe is equipped with two independently-operated front slides. The left hand slide carries a tool block and tool for facing

the open end of the shell to length and has a cross feed movement only. The right hand slide carries the combination rough and finish boring tools as well as the chamfer tool. This slide has both longitudinal and cross feed movements, providing tool relief on the return stroke of the boring bar. All tools operate simultaneously on a very fast machine cycle.

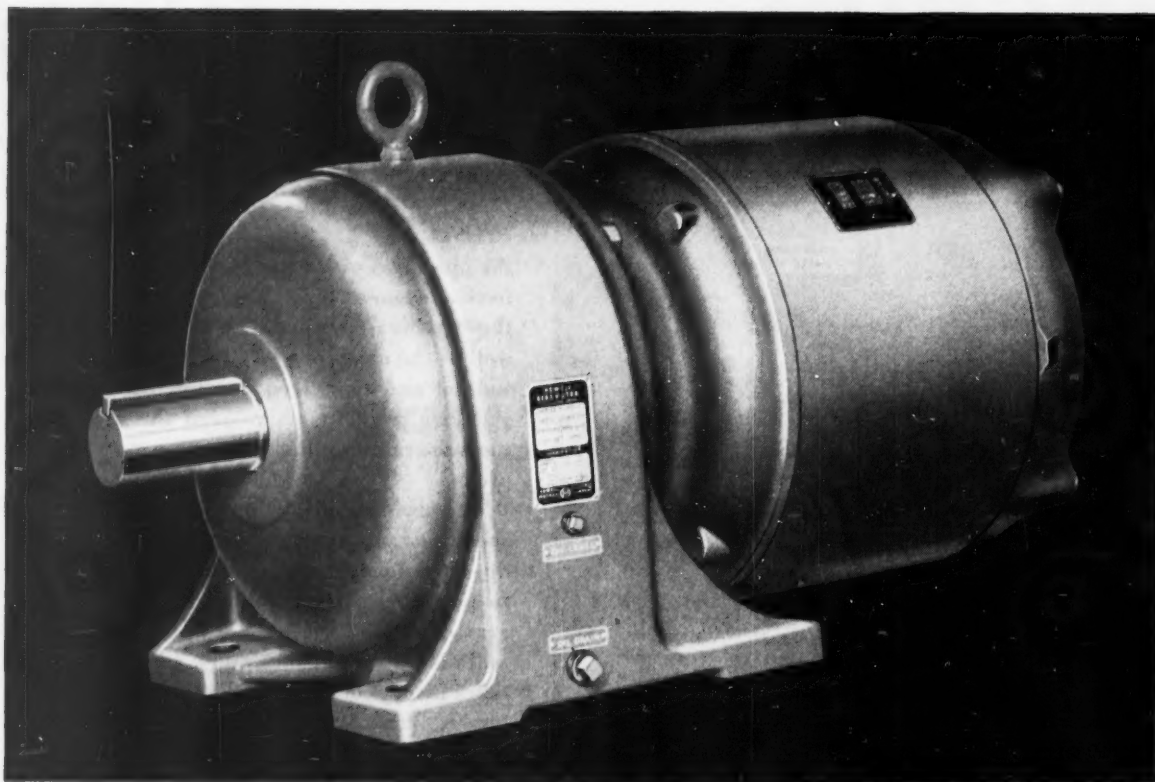
The problem of loading and unloading the heavy shells was solved with a double-arm, pneumatically-operated loader. A conveyor delivers rough shells to the rear of the machine. In position No. 1, one arm of the loader is directly above this conveyor and when lowered, picks up a rough shell while the other arm is clamped around the finished shell held between centers. The operator then moves a control lever which retracts the revolving rest and also opens the chuck jaws. The shell is pushed clear of the chuck jaws by means of a spring loaded plunger located in the headstock spindle. The operator now moves another control valve, which raises the loading device and swings it through 90 degrees to No. 2 position. This movement delivers the rough shell between centers and the finished shell to a second conveyor, located at the front of the machine, which leads to the next operation.

Seneca Falls engineers are at your disposal to help solve your turning and handling problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

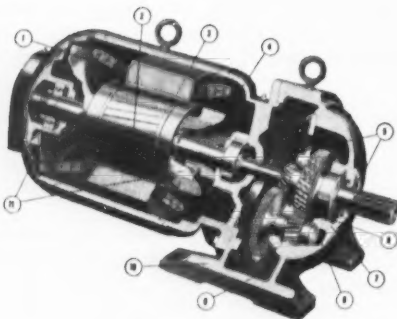


PRODUCTION COSTS ARE LOWER WITH Lo-swing



The power you need at the speed you need it . . .

## HOWELL GEAR MOTORS



### 11 reasons why Howell Gear Motors last longer, serve you better

1. High-quality insulation
2. Copper-clad rotor
3. Expert craftsmanship
4. High-quality coil varnish
5. Leakproof oil seals
6. Duti-Rated Lifetime Gearing
7. Unit case construction with integral bearing housings
8. Corner-mounted offset shaft
9. Large oil reservoir
10. Heavy, cast-iron construction
11. Superior cooling

48—MACHINERY, June, 1954

New dependability, greater starting torque and top efficiency, with output speeds as low as 7.5 rpm. are now available in Howell Gear Motors.

This compact, single-unit motor may well be the answer to your gear reduction problems. Combining the finest in heavy duty industrial gearing with the best in motoring, Howell Gear Motors reduce drive failures and production downtime.

Howell Gear Motors use duti-rated, lifetime gearing, with file-hard tooth surfaces and tough, resilient cores. They are available in all types of enclosures, from 7.5 to 780 rpm. with a capacity range from 1 to 30 hp., in all three AGMA service classifications.

For full information on Howell Gear Motors, contact the Howell man in your area, or write the factory direct for Bulletin GM-1.



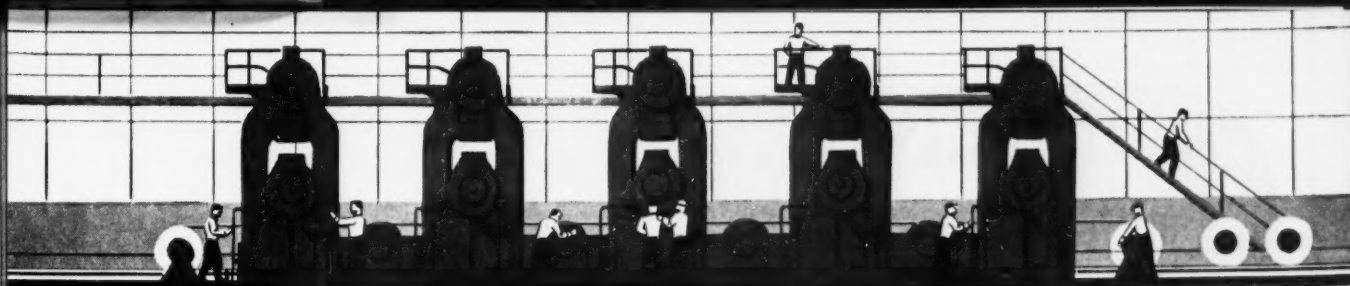
## HOWELL MOTORS

HOWELL ELECTRIC MOTORS COMPANY, HOWELL, MICHIGAN

MOTORS FOR INDUSTRY SINCE 1915

For more information on products advertised, use Inquiry Card, page 245





Now! cut application costs and grease inventories with

# NEW STANOLITH GREASE MP

You need only this *one* grease for many kinds of heavy equipment!

Added high-load carrying capacity!

Resists both water and high temperatures!

**STANOLITH  
GREASE MP**

Here is a newly formulated grease with such an increase in multi-purpose range that it helps you cut application costs and reduce grease inventories. Higher oil viscosity and greater extreme pressure properties make it suited for wide use in steel mills, cement mills, rubber mills, mining operations—all other heavy equipment industries.

More than just an "E. P." grease, New STANOLITH MP has all of the outstanding properties of STANOLITH greases: excellent oxidation stability and good mechanical stability. It has extreme water resistance and withstands high temperatures—it will not thin out. For better protection of all kinds of heavy equipment, under a wide range of conditions, use STANOLITH Grease MP.



New STANOLITH Grease MP takes its place with famous STANOLITH Greases No. 42 and No. 57 to give you the most versatile collection of multi-purpose greases in modern industry.

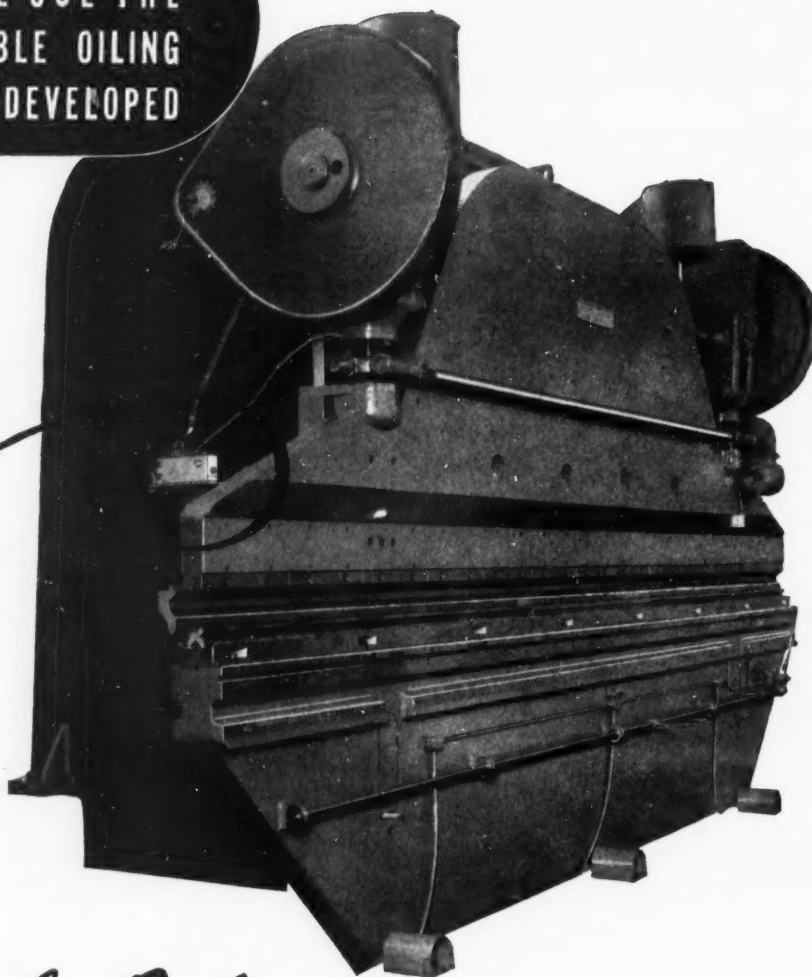
**STANDARD OIL COMPANY** (Indiana)

Call your nearby Standard Oil lubrication specialist and let him show you how Standard's "multi-purpose" greases can save you money and help you avoid trouble.



MACHINES OF GREAT  
PERFORMANCE USE THE  
MOST DEPENDABLE OILING  
SYSTEM EVER DEVELOPED

Illustrated is Madison-Kipp Lubricator Model FD installed as original equipment on a  $\frac{3}{4}$ " by 20" Cincinnati Press Brake, manufactured by the Cincinnati Shaper Co., Cincinnati, Ohio.



MADISON-KIPP

*Fresh Oil*

... by the measured drop, from a Madison-Kipp Lubricator is the most dependable method of lubrication ever developed. It is applied as original equipment on America's finest machine tools, work engines and compressors. You will definitely increase your production potential for years to come by specifying Madison-Kipp on all new machines you buy where oil under pressure fed drop by drop can be installed.

## MADISON-KIPP CORPORATION

203 Waubesa Street, Madison 10, Wis., U.S.A.

ANCIENS ATELIERS GASQUY, 31 Rue du Marais, Brussels, Belgium, sole agents for Belgium, Holland, France, and Switzerland.

WM. COULTHARD & CO. Ltd., Carlisle, England, sole agents for England, most European countries, India, Australia, and New Zealand.



- Skilled in DIE CASTING Mechanics
- Experienced in LUBRICATION Engineering
- Originators of Really High Speed AIR TOOLS

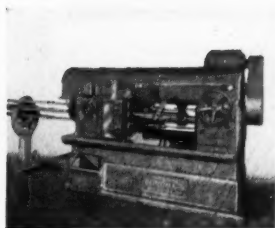


Multiple spindle automatic builders do not deny the importance of good frame design. As early as 1920 Cone's revolutionary frame was substantial evidence that Cone did something about it.

For some time there has been discussion concerning the relative merits of the use of 100% carbide tooling on multiple spindle bar automatics. There has been very little information made available about successful carbide application to this type of machine by its builders or by carbide suppliers. But Cone is doing something about it.

The Conomatic Carbide Development program is accumulating much helpful information for "automatic" users through test runs under production conditions. The illustration is an example of such information applied to an actual production run. Full data is available.

## Action speaks better

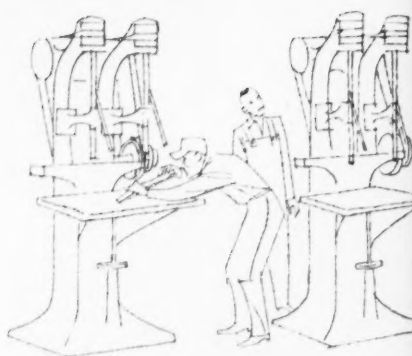


**MATERIAL—ALUMINUM:** Hole drilled with 1" and 1 $\frac{1}{16}$ " dia. drills to 1 $\frac{1}{2}$ " depth, and tapped to  $\frac{3}{4}$ " depth.

	HSS	CARBIDE
Cycle Time	90 secs.	11 secs.
Work Spindle Speed	270 R.P.M. at 104 S.F.	830 R.P.M. at 320 S.F.
Tool Wear	5,000 pcs. per grind	20,000 pcs. per grind

# Conomatic

CONE AUTOMATIC  
MACHINE COMPANY, INC.  
WINDSOR, VT., U.S.A.



## NOW'S the time to plan for PROFIT...

### with NEW Leland-Gifford Drilling Machines

Right now many of us have a breathing spell in the hurly-burly of production bottlenecks and backlogs. It's a great opportunity to get set for the stiff competition coming up — to beat the squeeze on profits already being felt.

Take a good look at the drilling machines which have been fighting your production battles for years. Then compare them with the new Leland-Gifford drilling machines.

With convenient central controls, fast speed changes, reduced work handling and many other advanced features, these modern drilling machines can boost production and accuracy to the point where profits are considerably widened and competition is not only met but bettered.

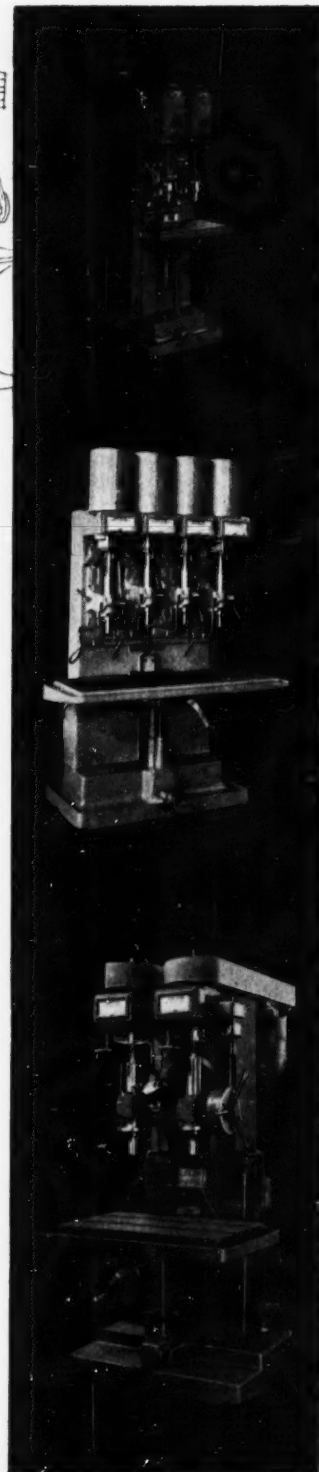
Your inquiries and orders will receive immediate, complete and personal attention. Deliveries can be made *promptly*.

*Get in touch with the office nearest you or write for complete information.*

## LELAND-GIFFORD

### *Drilling Machines*

WORCESTER 1, MASSACHUSETTS, U.S.A.

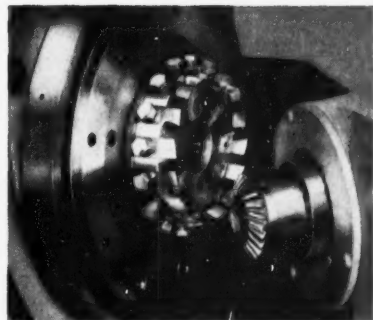
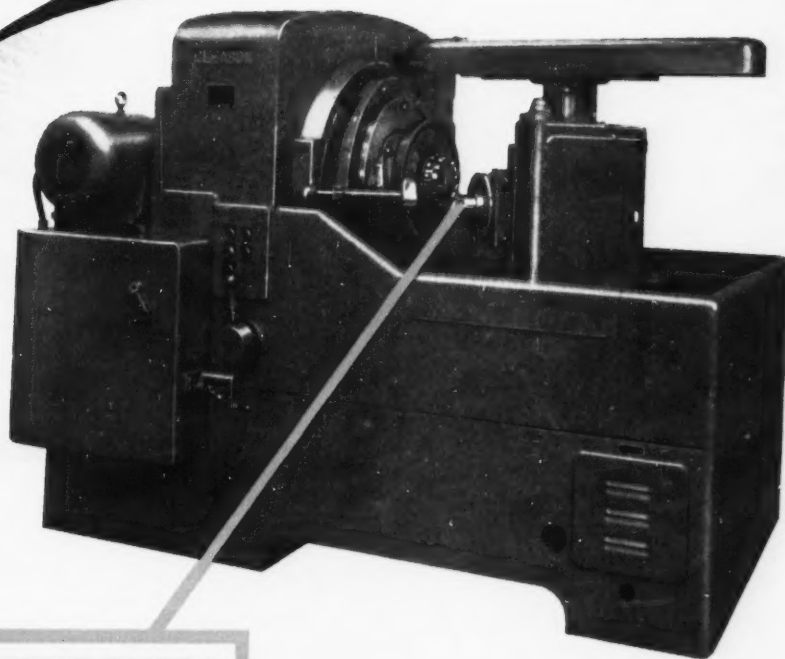


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- ROCHESTER 18  
P. O. Box 67, Roselawn Station



**NEW**

## NO. 106 HYPOID GENERATOR



This tractor belt pulley drive gear, 23 teeth, 7 D P, 11/16" face, 8620 steel, is completed in one operation at 14.6 sec. per tooth, 5.8 min. floor-to-floor time.

... For cutting spiral bevel, ZEROL® bevel, and hypoid gears up to 4 D P, 8½" diameter, 1¼" face

This versatile machine is ideal for small quantities or mass production of gears in the above size range. Greatly increased production rates are assured, because of its improved features, including cam-actuated generating motion, and rigid new-type cutter spindle construction. Many gears which previously required separate roughing and finishing cuts can now be completed in one operation, with marked savings in floor-to-floor time and handling time per piece.

Send prints of your bevel gears for an analysis of the cost savings this new generator can offer you.



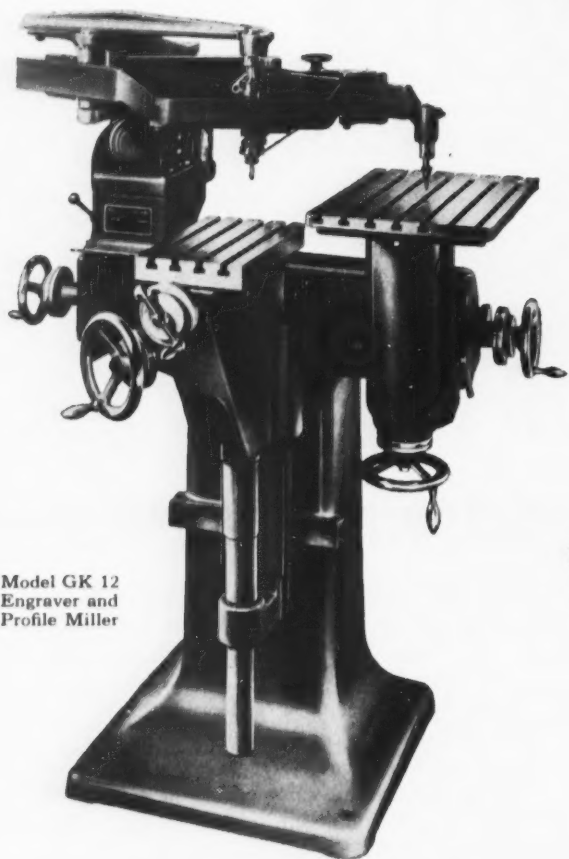
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BUILDERS OF BEVEL GEAR MACHINERY FOR OVER 85 YEARS  
1000 UNIVERSITY AVE. · ROCHESTER 3, NEW YORK

# DECKEL ENGRAVERS and PROFILE MILLERS

*for*

- Extreme Accuracy
- High Surface Finish
- Economical Production



Model GK 12  
Engraver and  
Profile Miller

Whether you are engraving small watch cases or profiling dies or molds up to 550 pounds, you can accomplish it with greater precision and speed on the Deckel GK 12 or GK 21 Three Dimensional Pantograph Engraver and Profile Miller.

The sensitive pantograph and adjustable cutter spindle — guided by finger-tip control — assures extreme accuracy in reproduction and excellent surface finish. Reducing or enlarging ratios range from 1:1.5 to 1:10.

These machines are equipped with forming attachments and can be furnished with cylindrical engraving attachments and other work holding devices. A rough milling attachment is available for the Model GK 21.

The GK 12 Miller is fitted with a smaller and lighter pantograph, making it ideal for delicate engraving, light milling and the production of dies for plastic molding or die casting.

The GK 21 Miller has a larger pantograph and heavier cutter spindle assembly to increase the metal cutting capacity; to permit rough milling and to copy mill dies and molds up to 550 lbs.

**SEE** THESE MACHINES IN OPERATION AT COSA'S NEW YORK SHOW ROOM OR SEND FOR DESCRIPTIVE LITERATURE.

Other Deckel Machines for Tooling and Production  
UNIVERSAL MILLERS  
2 DIMENSIONAL ENGRAVERS  
3 DIMENSIONAL ENGRAVERS  
UNIVERSAL TOOL & CUTTER GRINDERS

**COSA CORPORATION**  
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Your source for all Precision Machine Tools —  
from Small Bench Lathes to Large Boring Mills

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Versatile, rapid cycling, all-hydraulic  
H-P-M single action presses are ideally suited  
to a wide range of mass production jobs —  
straightening castings, coining,  
sizing, embossing, forming, drawing,  
assembling and many more. Automatic  
controls insure uniform results. Talk to an  
H-P-M engineer today about  
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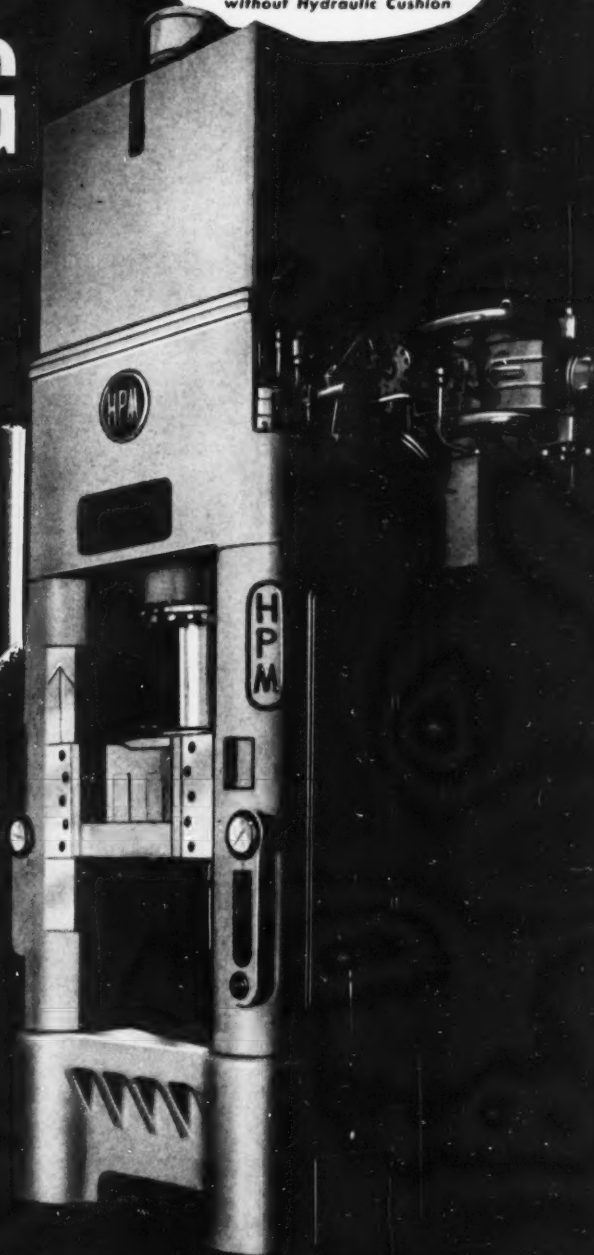
**THE  
HYDRAULIC PRESS  
MFG. COMPANY**

MOUNT GILEAD,  
OHIO, U. S. A.

A FEW OF THE HUNDREDS OF USERS OF  
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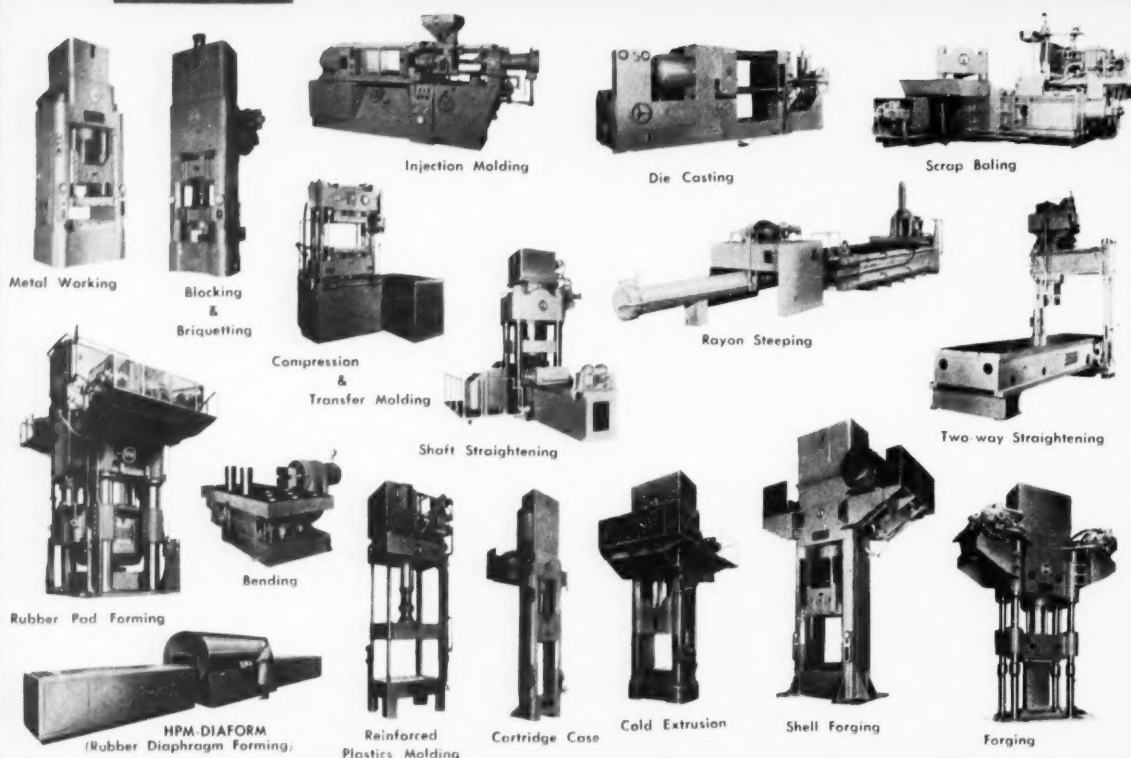
**H-P-M FASTRAVERSE**  
Single Action Press with or  
without Hydraulic Cushion



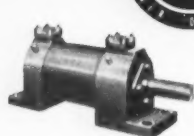
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# ALL-HYDRAULIC FASTRAVERSE PRESSES FOR EVERY PRESSURE PROCESSING NEED!




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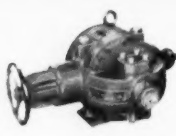
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150 P.S.I. Air and 300 to 3000 P.S.I. Oil Hydraulic



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Directional and Functional, complete range to 3000 P.S.I.



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The Hydraulic Press Mfg. Co.  
CABLE ADDRESS: "HYDRAULIC"

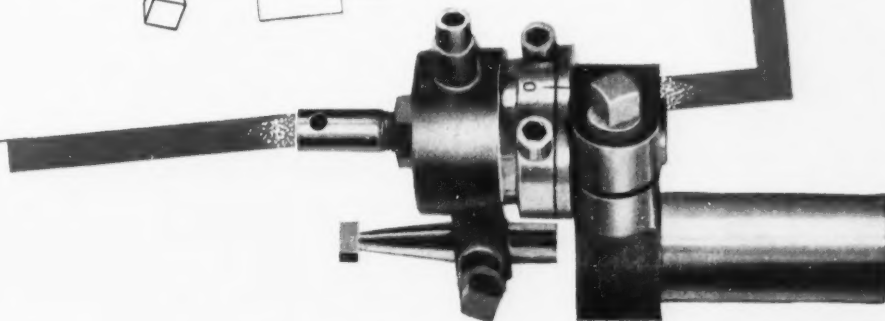
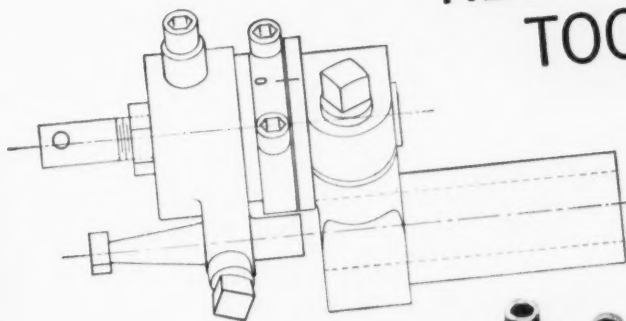


**THE HYDRAULIC PRESS MFG. CO.** MOUNT GILEAD, OHIO, U. S. A.



# **NEW** ADDITION TO R and L TOOL FAMILY

## RECESSING TOOL



Newly designed, THE R and L RECESSING TOOL is available in three standard sizes, ( $\frac{5}{8}$ ",  $\frac{3}{4}$ ", and 1" shank). The tool can be adjusted to operate on any internal diameter within capacity of machine . . . also adjustable to operate on outside diameters, (cutting grooves, chamfering, cutting clearance at end of threads, etc.) THE R and L RECESSING TOOL may be operated with spindle running right or left.

*Write  
for  
catalog*

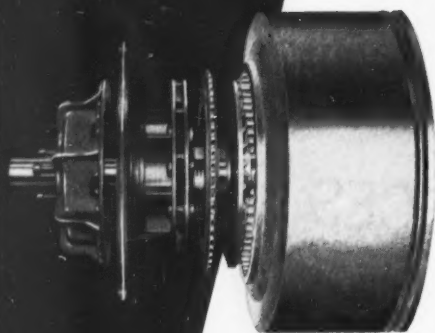
**R and L TOOLS**

1825 BRISTOL STREET • PHILADELPHIA 40, PA.

TURNING TOOL • CARBIDE OR ROLLER BACKRESTS • RELEASING OR NON-RELEASING TAP AND DIE HOLDERS, (ALSO FURNISHED FOR ACORN DIES) • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER  
RECESSING TOOL • REVOLVING STOCK STOP • FLOATING DRILL HOLDER • KNURLING TOOL

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—57



### Exploded View of Air Operated Disc Clutch

- ... another Columbia exclusive. It eliminates unnecessary gear wear
- ... gives never-failing overload protection
- ... cushions shock!

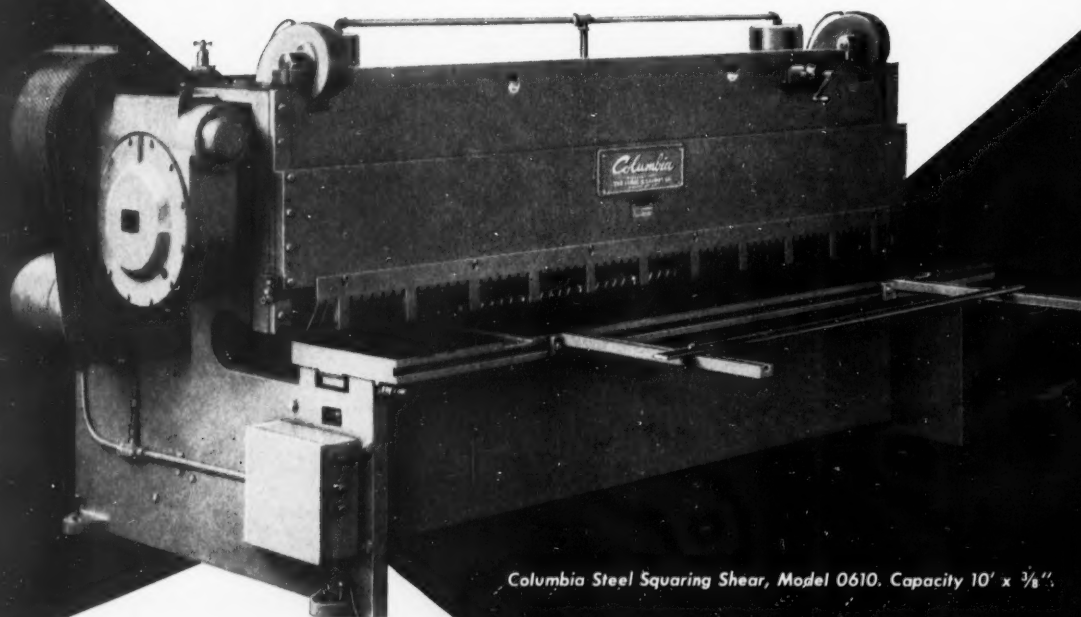
## Columbia STEEL SQUARING SHEARS

up to **75%** less gear wear  
with the **exclusive air clutch!**

A cost-reducing, safety Air Clutch is one of the many exclusive, built-in Columbia "New Series" Shear features.

This air-operated clutch reduces gear wear as much as 75% since all gear movement is eliminated except in the actual cutting cycle. Inherent clutch slippage at the overload point protects machine and drive. Air-application of power is soft; shocks are not transmitted.

Other Columbia features you should know about include the exclusive Quick-Set Blade Clearance, Hydraulic Hold-downs, Jog Control for Ram Back Brace Adjustment, Air Counterbalances, Remote Foot Switch, and others. Together with basic ruggedness, rigidity and long-lasting accuracy these features mean that Columbia Shears offer more machine for the money!



Columbia Steel Squaring Shear, Model 0610. Capacity 10' x 3/8".

Other exclusive Columbia features are explained in detail in FREE Bulletin No. PS-2. Write for it and the name of your Columbia dealer, today!

COLUMBIA DIVISION, THE LODGE & SHIPLEY CO.  
HAMILTON 1, OHIO

new series

**Columbia**

STEEL  
SQUARING  
SHEARS

and POWER PRESS BRAKES

**Only Yoder-TOCCO  
Makes**



**at 250'  
per minute**

**in Regular Production**

Yoder-TOCCO mills, using the patented TOCCO Process for welding ferrous pipe and tubing are actually producing pipe at speeds of 150 to 250 feet per minute. This rate is almost twice as fast as any other cold forming pipe mill in production anywhere in the world. *Check these advantages:*

- ✓ A production speed of 200' per min.
- ✓ lower cost because of increased production and lower maintenance.
- ✓ a smooth, continuous weld—no stitching.
- ✓ an extra strong weld—because it's 100% uniform and continuous.
- ✓ no scaling of ferrous tubing.
- ✓ controlled weld flash—either I. D. or O. D.—or in some cases none.

Whether it's welding, heat-treating, brazing, melting or heating for forging operations, it pays you to investigate TOCCO Induction Heating as a means to better products, faster and at lower cost.

**THE OHIO CRANKSHAFT COMPANY**



**TOCCO**

**FREE  
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Mail Coupon Today

**THE OHIO CRANKSHAFT CO.**  
Dept. M-6, Cleveland 1, Ohio

Please send copy of "TOCCO Induction Heating"

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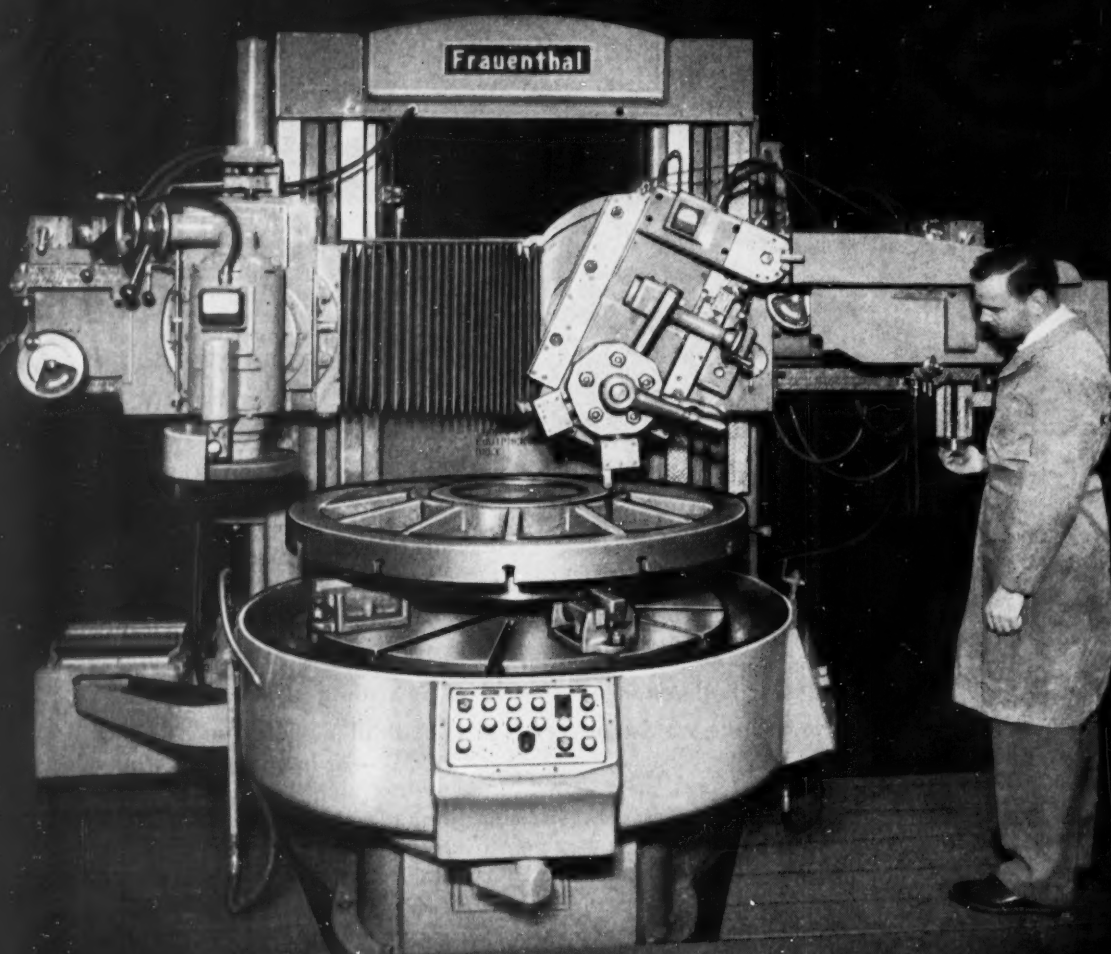
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# announcing...



Frauenthal Division • THE KAYDON



## The Frauenthal Series 3100 precision turning and grinding machine

**NOW AVAILABLE FOR THE FIRST TIME** — here's a machine specifically designed to perform finish turning and ultra-precision grinding operations. With it, you can produce accuracies previously considered impractical, with assured concentricity of related surfaces finished on a one-setup basis!

Originally designed to meet the exacting requirements of jet engine production, the Series 3100 machine is completely new from the ground up. Its unique design opens up new possibilities for machining large work-piece, close-tolerance jobs on a mass-production basis. The Series 3100 offers the entire metal-working industry exceptional new capacity for precision turning and precision grinding.

### CHECK THESE IMPORTANT FEATURES

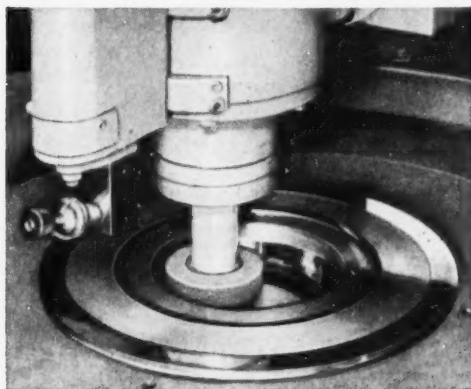
- Ultra-precision work-table bearings
- Hydraulically actuated turning slide
- Hydraulically actuated grinding slide
- Hydraulic grinding spindle
- Conveniently located controls and safety switches

### ... AND THIS OPTIONAL EQUIPMENT

- Hydraulic tracer control
- Electronic surface speed control
- Hydraulic wheel dressers for varied applications



Here, the operator uses a Series 3100 machine to bore out the inside diameter.



This closeup shows how the machine performs close-tolerance finish grinding of the workpiece's top surfaces and inside diameter.

### May we help you?

If you'd like to have details on how the Series 3100 can offer you new tool room or production benefits — our engineers are at your service. Write for informative bulletin No. 301.



**Frauenthal** MULTIPLE-HEAD  
SUPER-PRECISION  
VERTICAL **Grinders**

**ENGINEERING CORP. • Muskegon, Michigan**



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*You'll be in good company  
when you, too, use*

## TORRINGTON NEEDLE BEARINGS

When you build the high capacity and long service life of Torrington Needle Bearings into your products, you will join the manufacturers whose trade-marks are reproduced here—and thousands more—who use Needle Bearings.

Our Engineering Department will be glad to help you determine how Needle Bearings can be used to advantage in your products.

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## TORRINGTON *NEEDLE* BEARINGS

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**Plan Now for Increased Productivity**

# call on **C.P.C.\***

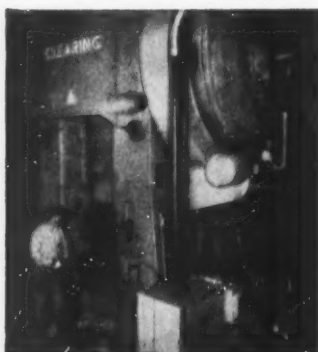
The new field of cold extrusion demonstrates an example of Clearing's forward-looking attitude. Working closely with companies who pioneered this process were \*Clearing Productivity Consultants. The result of this collaboration has led to the development of Clearing extrusion presses—presses specifically designed to bring the increased benefits of a new and improved manufacturing method to American Industry.

Clearing Presses, like those shown in the illustration on the opposite page, have been producing cold extrusions for several years. In this field, as in every phase of press metalworking there is a Clearing specialist ready to discuss your metalforming problems with you in detail. This service is available to any manufacturer, large or small, without obligation. Plan now for increased productivity by calling on Clearing Machine Corporation today.



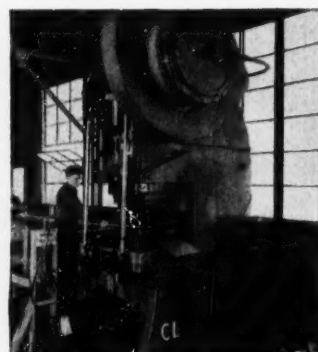
If you are involved in the mass production of blanked, formed or drawn stampings, the cost of producing these is a major item in the cost of your product. Clearing engineers are working toward lowering these costs and increasing output from each press. Our engineers are at your service to help you plan for increased productivity.

This 7,000 ton hydraulic press solved a problem by enabling the user to gang his dies and produce a number of parts each stroke. A press like this or a line of smaller hydraulics may be the method to boost production in your plant. A call to Clearing will send a hydraulic press engineer to help work out your metalforming problem.



If you have not investigated the economies offered by the closed-die forging method, there is a Clearing consultant to go into this matter with you. Superior physicals, elimination of machining operations and material savings are important considerations that a C.P.C. can discuss with you in detail.

The ruggedness of Clearing O.B.I.'s permits making full use of the efficiency of this type of machine on truly heavy-duty jobs. Why not let a Clearing inclinable press engineer explain why manufacturers of small and middle range stampings are turning to Clearing O.B.I.'s for increased productivity?



## **CLEARING PRESSES**

THE WAY TO EFFICIENT MASS PRODUCTION



CLEARING



# FOOTBURT

sensitive drilling machines

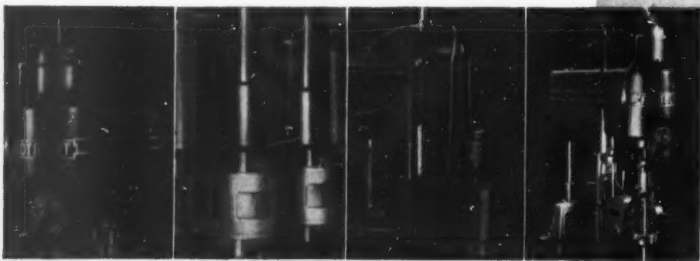
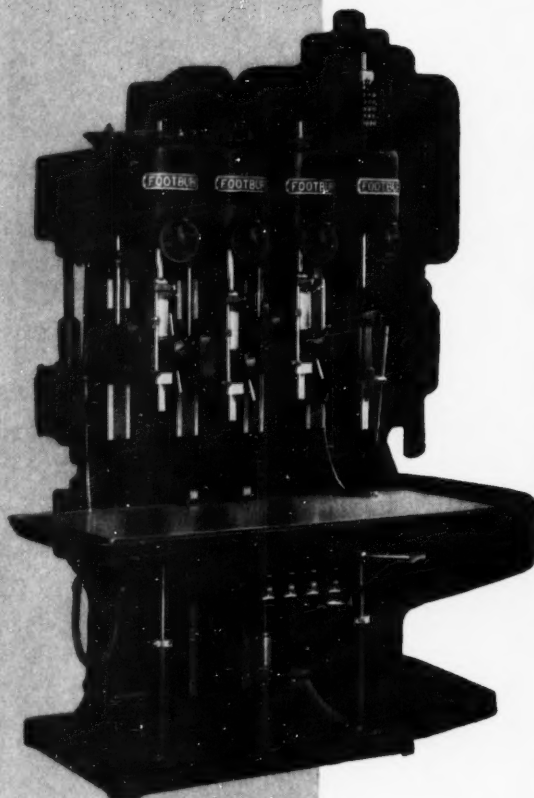
**A FULL RANGE  
DRILLING MACHINE  
ENGINEERED FOR PRODUCTION**

Built carefully to provide the required accuracy for fine tool room work, Footburt Sensitive are designed with the weight and stability to maintain close tolerances on day after day production work. The correct speed for a wide range of drilling, reaming, and counterboring operations is instantly available. Write for full information on this great line of Sensitive Drilling Machines. Built in 1, 2, 3, 4, 6 Spindle Models.

**THE FOOTE-BURT COMPANY**

Cleveland 8, Ohio

Detroit Office: General Motors Building



No. 2 Machine with Back Gear • 12" Overhang •  $\frac{3}{8}$ " Drilling Capacity in Steel • Optional Speed Ranges • 185 to 2300 RPM • 280 to 3450 RPM • Vertical Motor Drive with Standard Single Speed Motor • Power Feed Assembly • Tapping Attachment • Coolant Outfit.

*★engineered  
for  
production*

# FOOTBURT

M A C H I N E T O O L S

# SIMONDS Shear Knife SELECTOR CHART

helps you pick the **BEST**  
for your job!



**RED STREAK**

## FORGED ROTARY SHEAR KNIVES

**SIMONDS**  
SAW AND STEEL CO.

FITCHBURG, MASS.

Whether you're shearing hot or cold rolled steel, tin plate or non-ferrous metals . . . separately or in gang slitting operations . . . Simonds tailors a "Red Streak" Rotary Shear Knife specifically for your application. Made in 3 different Simonds own electric furnace steels, these job-engineered knives give you cleaner, higher quality slitting . . . and longer service between sharpenings.

Forged for maximum strength and resistance to wear, as well as to prevent nicking or breaking out under shearing pressure, "Red Streak" Shear Knives are precision ground to close tolerances and a low micro-inch surface finish.

These are all "reasons why" Simonds Shears give better results in the long run . . . why it will pay you to send for the free "Shear Selector Chart" and to place your next Shear Knife order with Simonds.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon  
Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.  
Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

Name and Number of Knife	For Shearing	Max. Thickness in Thousandths
<b>High Chrome Steel</b>		
Hot Rolled 150	Hot Rolled Steel	.150"
Hot Rolled 250	Hot Rolled Steel	.250"
Cold Rolled 100	Cold Rolled Steel	.100"
Cold Rolled 200	Cold Rolled Steel	.200"
Tin Plate 50	Tin Plate	.050"
Non-Ferrous 65	Non-Ferrous Metals	.065"
Non-Ferrous 100	Non-Ferrous Metals	.100"
<b>Special Alloy Steel</b>		
Hot Rolled 100	Hot Rolled Steel (40 Carbon or under)	.100"
Cold Rolled 65	Cold Rolled Steel (40 Carbon or under)	.065"
Cold Rolled 150	Cold Rolled Steel (40 Carbon or under)	.150"
Non-Ferrous 100	Non-Ferrous Metals	.100"
Non-Ferrous 150	Non-Ferrous Metals	.150"
Non-Ferrous 200	Non-Ferrous Metals	.200"
Non-Ferrous 375	Non-Ferrous Metals	.375"
<b>High Speed Steel</b>		
Hot Rolled 20	Hot Rolled Steel (5% Silicon)	.020"
Hot Rolled 40	Hot Rolled Steel (2% Silicon)	.040"
Cold Rolled 20	Cold Rolled Steel (5% Silicon)	.020"
Cold Rolled 40	Cold Rolled Steel (2% Silicon)	.040"

EXAMPLE: If you are shearing 20 Carbon Cold Rolled steel, .125" thick, you should specify High Chrome 200 knives. Since your material is less than 40 Carbon, but this type of knife will not stay sharp as long as High Chrome knives.

The Big Trend in Metalworking...

# *MOVE the metal ...it's cheaper than*

## HOW NEW METHODS SAVE BIG SUMS

A. Parts are produced primarily by forcing metal into the desired shape rather than by "removing" or "machining" it. It is far faster... saves tremendously in time and labor.

B. The amount of metal in the initial slug, shot, billet, sheet, etc., is only slightly more than the total amount in the finished piece. Thus scrap and machining are held to an absolute minimum.

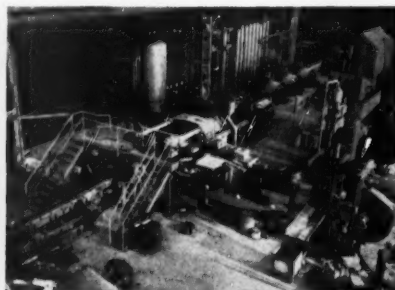
Metalworking plants casting about for ways to reduce production costs are turning more and more to the newer methods of forging, drawing and extruding in which metal is being "pushed around" rather than "removed." These processes basically are the hot extrusion of alloy steel, cold "pressure" forging of aluminum, cold extrusion of steel, and high pressure closed die extruding of aluminum and other non-ferrous alloys. Also falling within this category



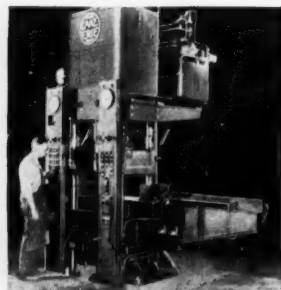
Closed die extruding of heated aluminum reduced production time 99%.



Cold steel extrusion reduced scrap 43%.



Hot alloy steel extrusion is now an established art.



Metal powder parts are often produced with no machining.



- *New and improved production techniques save millions...arouse widespread interest*

1. Actual parts production is cut from hours in typical cases to minutes or even seconds.
2. Pieces generally have superior finish and improved physicals including grain structure.
3. Tolerances and uniformity equal or better those of older methods.
4. Scrap is greatly reduced and in many cases practically eliminated.
5. Unit costs go way down.

# *REMOVING it!*

are somewhat older though greatly changed and improved methods for the extrusion of aluminum, hot forging of ferrous metals, powder metallurgy, deep drawing of sheet and die casting. The most recent developments involve variations and combinations of the above applied to many products and materials. Our engineers are in close daily contact with these developments. They'll be glad to help apply any of them to your production. Call or write us.



**LAKE ERIE ENGINEERING CORP.**

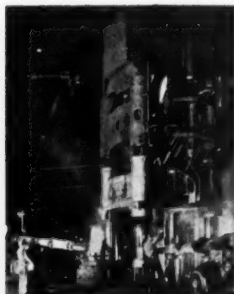
*General Offices and Plant:*

470 Woodward Avenue, Buffalo 17, N. Y.

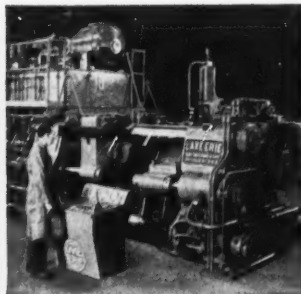
District Offices in New York • Chicago • Detroit • Pittsburgh

*Representatives in Other U. S. Cities and Foreign Countries*

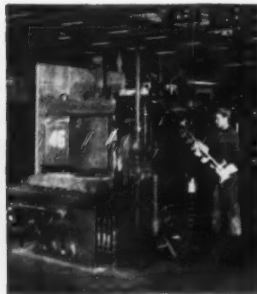
HYDRAULIC PRESSES • DIE CASTING MACHINES  
ROLLING MILL AUXILIARY EQUIPMENT



New developments in steel forging have greatly expanded its application.



Non-ferrous extrusion installations now embrace titanium, magnesium and newer metals.

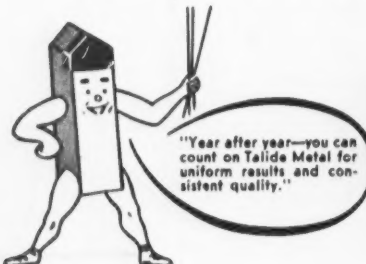
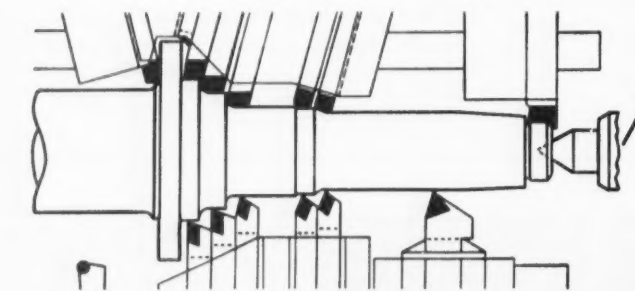
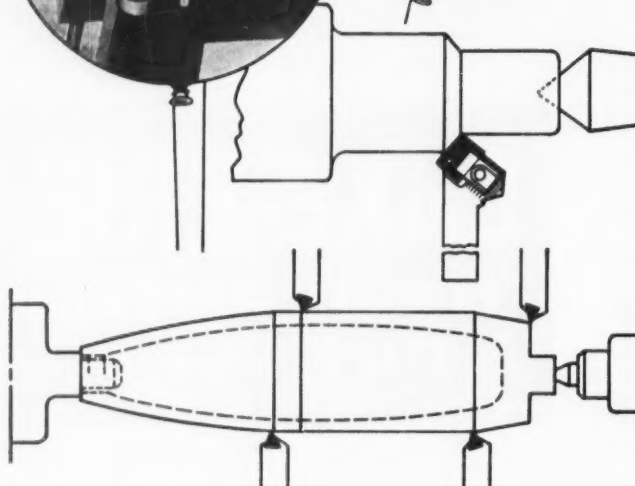
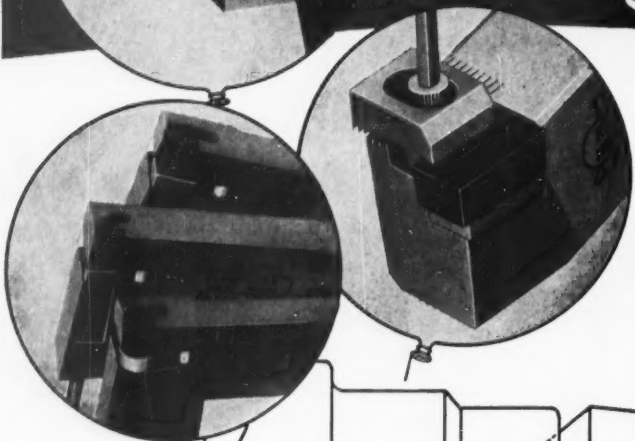


Production rates of die cast aluminum and zinc parts have been upped 20% to 30%.

## *PACKAGED INSTALLATIONS*

A new service by Lake Erie which enables you to order an integrated installation...including production equipment, tooling auxiliary equipment and advisory service...from a single source thereby saving time, money and trouble.

# Talide Tipped Tools for EVERY Cutting Operation



## USERS REPORT SUPERIOR RESULTS

### LARGE PITTSBURGH ROLL FOUNDRY

PART..... SAE 52100 forged chrome steel mill roll 28" O.D.  
OPERATION..... Rough turn and finish machine roll necks and barrel.  
MACHINE..... 48" x 15' Mackintosh-Hemphill Lathe, 50 H.P. motor drive.  
TOOL..... H-Style Klamp-Lok Toolholder with horizontal clamped Talide insert—Grade S-88 for roughing —Grade S-92 for finishing.  
DEPTH OF CUT.....  $\frac{3}{8}$ " for roughing cuts.  
.....  $\frac{1}{8}$ " for finishing cuts.  
FEED..... .050  
S.F.M..... 125 to 210  
RESULTS..... Talide tools held cutting edge 40% longer per grind than previous grade used — even at temperatures of 1700° F!

### LARGE CHICAGO SHELL PLANT

PART..... 105 M/M (M-1) H.E. Shell.  
OPERATION..... Rough turn shell body, 1050 Steel Forging.  
MACHINE..... 12" x 21" Fay Automatic Lathe.  
TOOLS..... TB-16 Triangular Talide Inserts with  $\frac{3}{32}$ " radius vertically clamped in Klamp-Lok Toolholder Grade S-92.  
DEPTH OF CUT.....  $\frac{3}{8}$ "  
FEED..... .035  
S.F.M..... 325  
RESULTS..... 45 Shells per grind or 25% increase over previous average of 35 shells.

### LARGE MID-WEST TRACTOR PLANT

PART..... Shaft Steering Clutch, SAE 8454-H Brinell 370.  
OPERATION..... Rough Straddle Face Flange, turn all diameters, form undercut and base.  
MACHINE..... 16 x 60 Sunstrand Automatic Lathe.  
TOOLS..... 8 Talide-tipped facing, chamfering, radius and form tools Grade S-88. 7 Klamp-Lok Toolholders with round, triangular and parallelogram Talide inserts Grade S-88.  
DEPTH OF CUT.....  $\frac{9}{32}$ " to  $\frac{7}{16}$ "  
FEED..... .022  
S.F.M..... 154  
RESULTS..... Production up 20% — Scrap and rejects down.

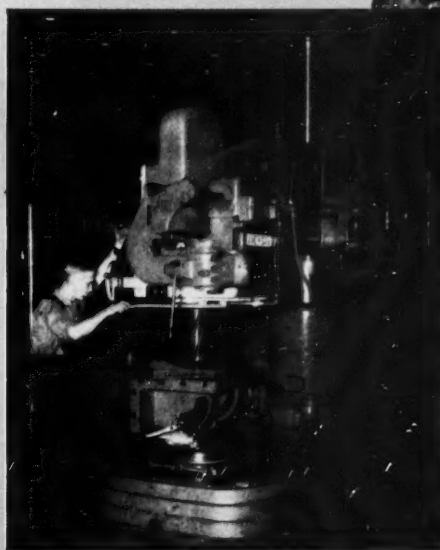
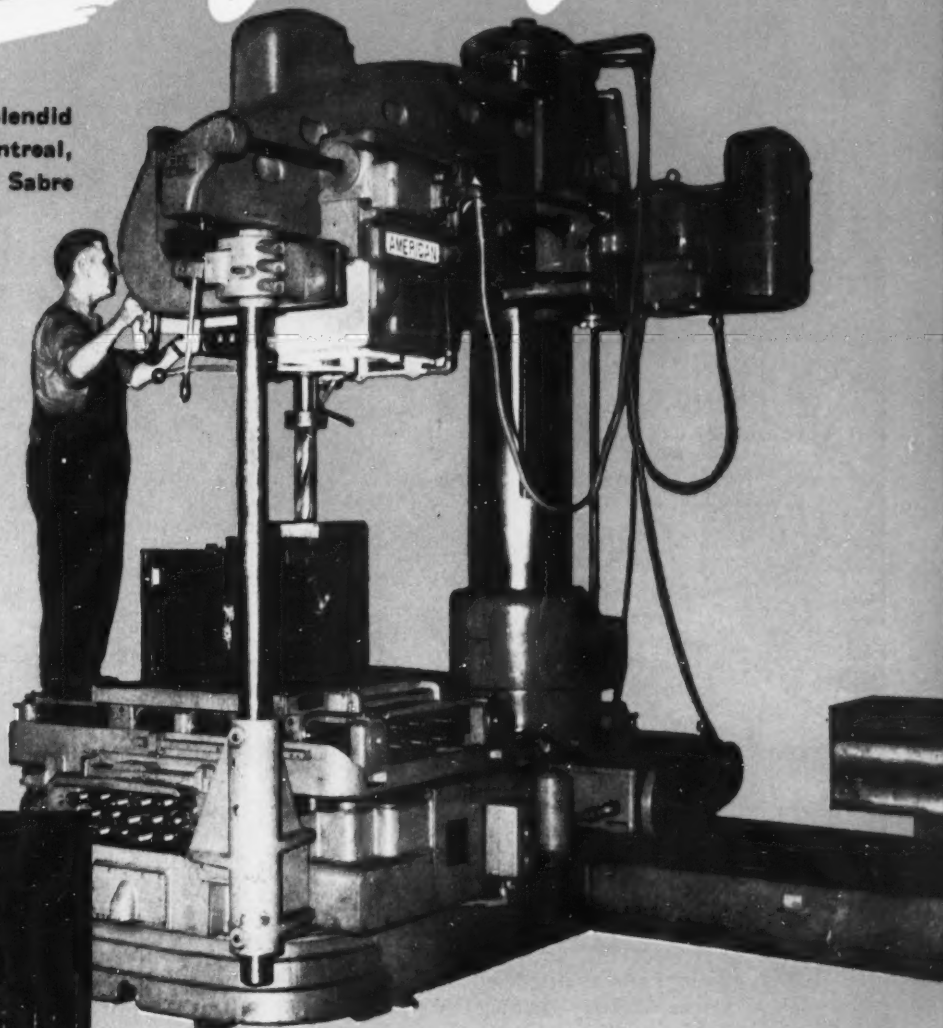
Complete stocks of standard Talide Tools and Tips are immediately available from our warehouses located in Newark, Youngstown, Detroit, Chicago and Los Angeles. Write for General Catalog No. 54-G, Metal Carbides Corporation, Youngstown 7, Ohio.



# On **TOP** of his job!

This operator is doing a splendid job at Canadair Limited, Montreal, on the production of F-86E Sabre Jets for the RCAF and, as the illustration shows, he is right on top of his job, too.

He is proud of his fine new 6' 17" column "AMERICAN" Hole Wizard Radial. "It's powerful; it's sturdy; it's easy to operate, and I'm not worn out at the end of the day". What more could any operator ask? As a consequence he turns out a lot of fine work which makes his machine a paying investment for the company.



This "American" Hole Wizard Radial has a right angle base, on one wing of which is mounted a Bullard Man-Au-Trol Spacer—as shown by the illustration.

"AMERICAN" Hole Wizard Radials are playing a prominent part in the production of critical defense items for both the U. S. A. and Canada.

For a complete revelation of their virtues send for descriptive bulletin No. 327.

**THE AMERICAN TOOL WORKS CO.**

Cincinnati 2, Ohio, U. S. A.

**LATHES AND RADIAL DRILLS**





**NATIONAL HEADERS Assure Dial-Indicator Accuracy!**

This efficient and highly productive Header Department of The American Screw Company, Willimantic, Connecticut . . . 116-year-old leading producer of Wood, Machine, and Tapping screws with either Phillips Recessed or Slotted Heads . . . produces thousands of gross of fasteners daily.

American Screw relies upon its large bat-

teries of National Cold Headers to give day-after-day quantity and quality production.

If you have a forging problem . . . large or small, hot or cold, ferrous or nonferrous . . . let us help you solve it. Send us prints, or a sample part, or better yet, visit us. No obligation.

**NATIONAL**  
MACHINERY COMPANY

TIFFIN, OHIO—SINCE 1874

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS • BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS

Hartford

Detroit

Chicago





## Diamonds are a tool's best friend

Hard cemented carbide cutting tools demand keen edges, extra-fine finishes, close tolerances...and you'll get all this with Diamond Wheels by CARBORUNDUM. They cut cool—increase tool life...hold size and

profile—give the sharpest edges—where sharpness is important...reduce grinding time—often eliminate intermediate operations...save you money—one wheel grinds thousands of tools. For roughing

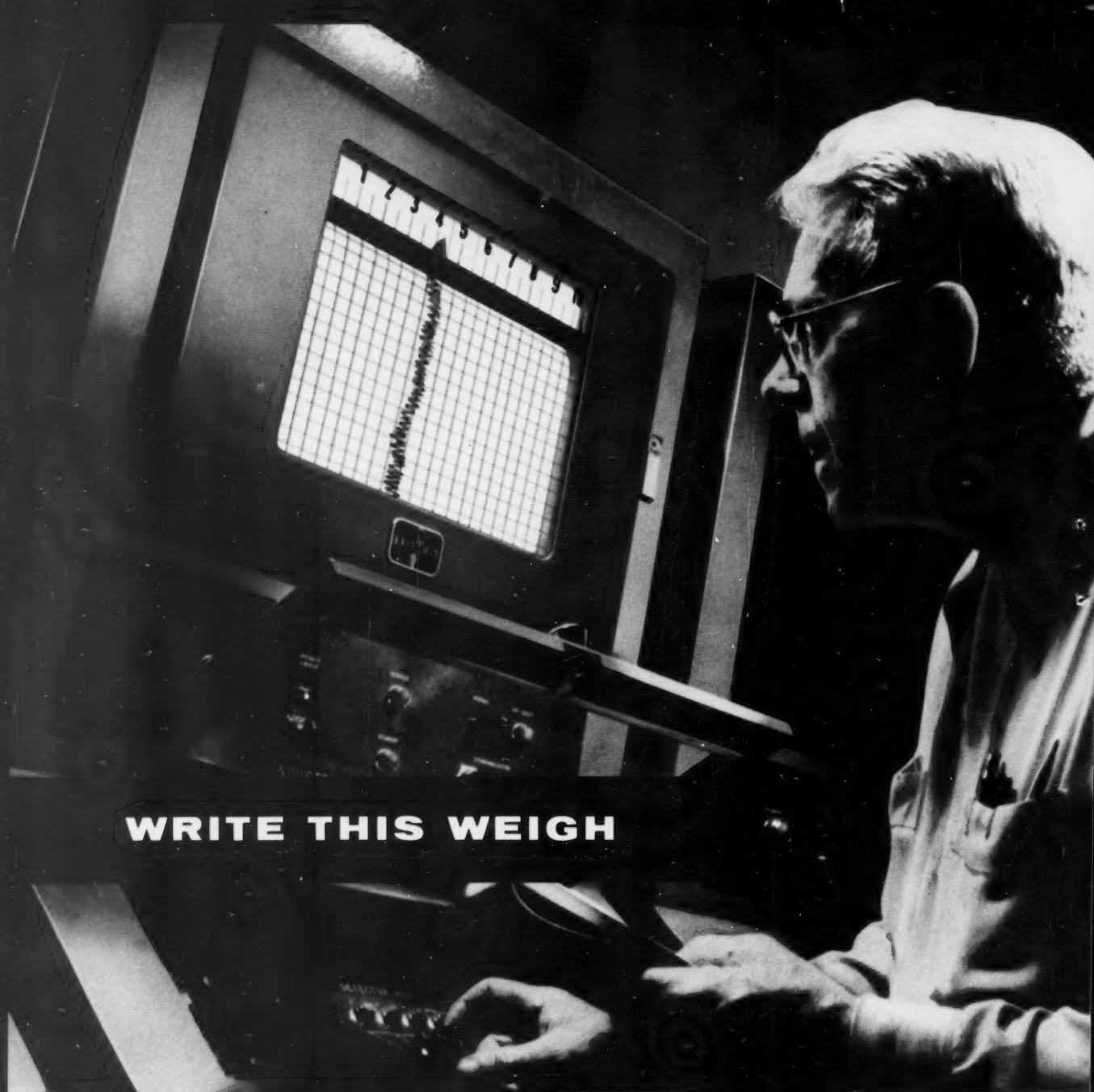
dull or broken tools...use GREEN-GRIT Silicon Carbide Wheels by CARBORUNDUM. For expert counsel, fast service for every tool grinding operation, call your CARBORUNDUM Distributor or Salesman.

Through product quality and application "know-how"

# CARBORUNDUM

REGISTERED TRADE MARK

continually puts more **sense** in your abrasive **dollar**



## WRITE THIS WEIGH

This Beta-Ray Gauge supervises the scientific precision you get in all Coated Abrasive Products by CARBORUNDUM. With its piercing nuclear "eyes" it measures and records the weight, or thickness of the backing, bond and abrasive grain

as they are combined on giant roll-making machines. The result: dependably uniform coated abrasive products, unvarying in quality from one order to the next... to give you consistently dependable performance on every sanding and finish-

ing job. This is but one of many scientific quality checks made by CARBORUNDUM on all coated abrasive products, to give you fast, efficient economical sanding and finishing. Your CARBORUNDUM Distributor or Salesman is the man to call.

Through product quality and application "know-how"

# CARBORUNDUM

REGISTERED TRADE MARK

continually puts more **sense** in your abrasive **dollar**



#### CINCINNATI 19" HYDROFORM

Five additional Hydroform machines of 8", 12", 23", 26" and 32" capacities are available.

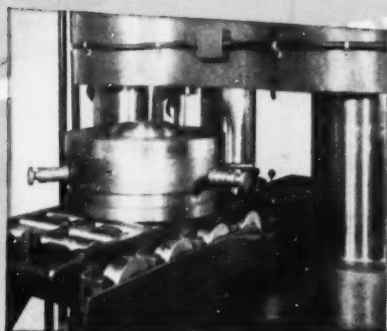
## TOOL SET-UP NOW

# further simplified

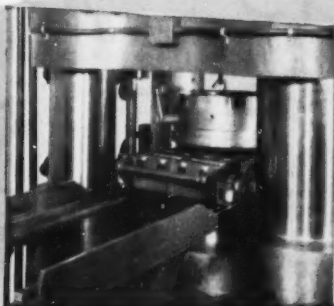
## ON THE LARGER CINCINNATI HYDROFORMS

Now supplied with Cincinnati Hydroforms of 19", 23", 26" and 32" capacities is an integral tool conveying and handling system which facilitates the installation and removal of the tooling. The photographs below illustrate the tool handling method which eliminates any manual lifting of the components.

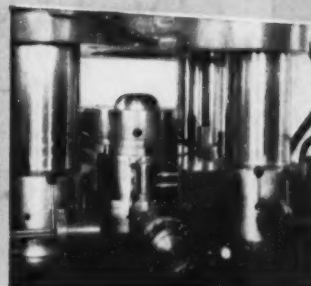
Design refinements such as this continue to simplify Hydroforming—which in itself has reduced the deep drawing process to its simplest form. Investigate the many Hydroforming advantages—for your part development work—or for short run production. Let a Cincinnati Milling field engineer give you complete details. For general Hydroform data and specifications of the six machine sizes, write for your copy of Bulletin M-1759-3.



**a** Roller conveyor for moving Hydroform tools—punch, draw ring and draw ring support—into position. Punch is seated on pin inserted through holes in draw ring support. Three lifting rods are inserted into draw ring support.



**b** Roller conveyor with tooling beneath the Hydroform dome. By lowering dome, connecting "S" hooks and then raising dome, tooling is lifted. (In this view, punch has been removed to show two of the "S" hooks holding tooling.)



**c** Tooling in final position. Lowering dome seats tools on bolster plate. Lifting rods are removed. Connecting punch to the ram completes the set-up. Tools are self-centering. In this manner, tools can be changed in 10 minutes.



# Hydroform

**THE CINCINNATI MILLING MACHINE CO.**  
CINCINNATI 9, OHIO, U. S. A.



# modern machines

## MAKE modern furniture...

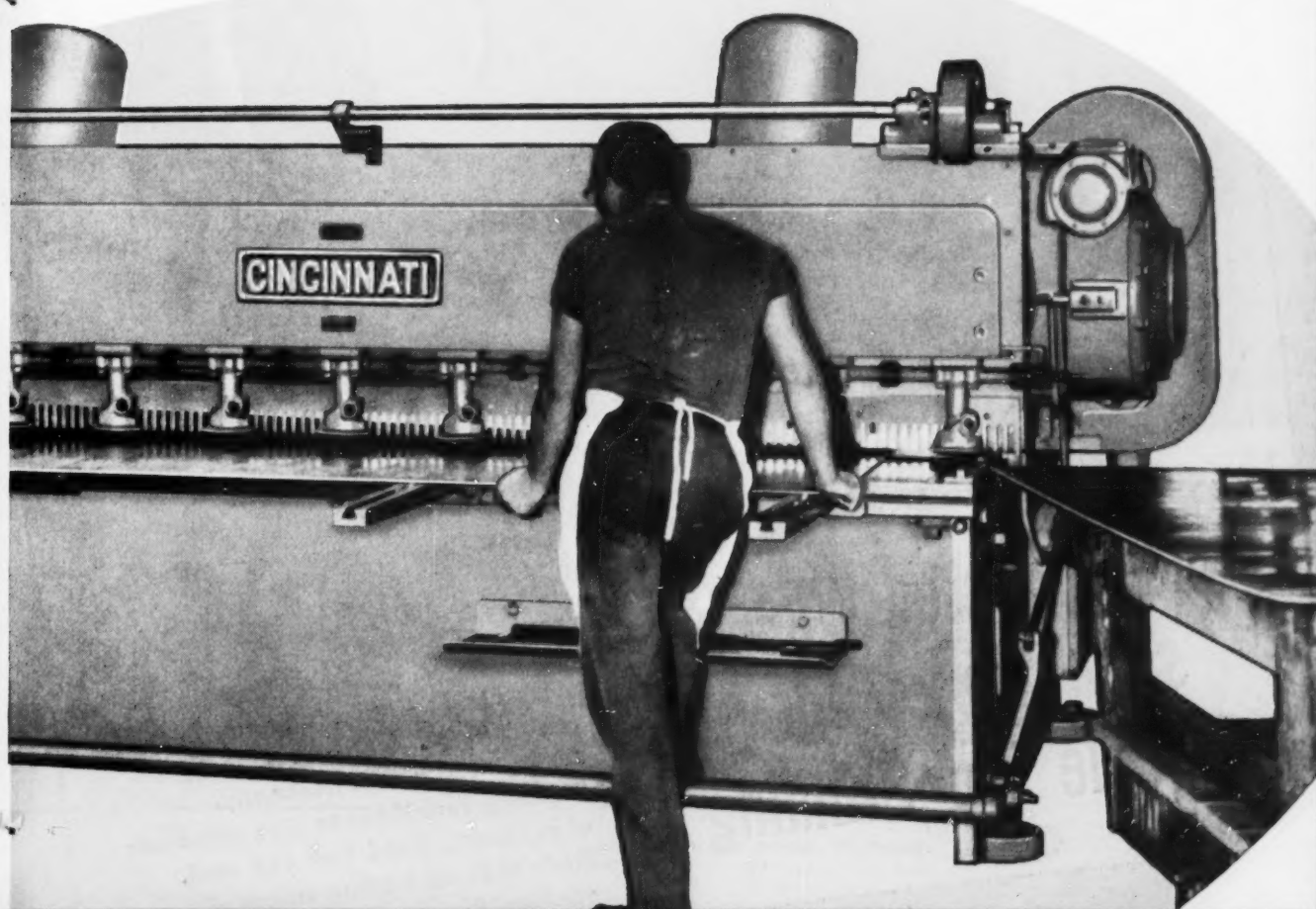


*Photos courtesy The Troy Sunshade Company, Troy, Ohio*



In this modern furniture factory, modern Cincinnati Shears give an accurate, economical and versatile performance. Ease of operation, rapid, simple gauging, holding work securely and clean cutting, all speed production and reduce costs.

Write for Cincinnati Shear Catalog S-6.

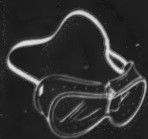


**THE CINCINNATI SHAPER CO.**

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES

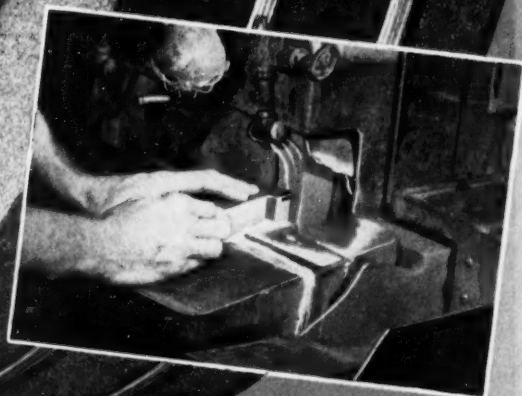




any way  
you look  
at it...

**SIMONDS**  
ABRASIVE CO.

# Plate Mounted Wheels *save money for* Carbide Tool Grinding



Less costly than diamond wheels!  
Especially efficient for roughing,  
semi-finishing and, frequently,  
finishing, tool Made to high standards  
of accuracy. Grind fast and cool.  
Made to fit all leading makes of  
grinders. Prompt delivery from stock.  
Write for bulletin ESA-181.

**SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.**

BRANCH WAREHOUSES: BOSTON, DETROIT, CHICAGO, PORTLAND, SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. • OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N. Y.

SIMONDS CANADA SAW CO., LTD., MONTREAL, QUEBEC AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUEBEC

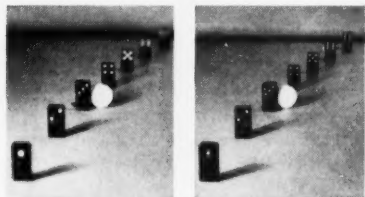
## Plain Pointers on Projection

ONE of the claims we make concerning the Kodak Contour Projector is that once an object is brought into focus at any given magnification it will remain in focus when magnification is changed. (This freedom to change magnification is made possible through the use of a lens turret, mounting six lenses, and speeds inspection procedures.) An operator only need flick a dial to switch from one magnification to another; no time is lost refocusing.

Occasionally, however, one of our customers writes to question our claim and declares that he has found it necessary to refocus when changing magnification. This does not upset us. Almost invariably the difficulty can be traced to the phenomenon of optics called "depth of field." This refers to the distance between the nearest and farthest points sharply defined by a lens and is aptly illustrated by the picture below. It is apparent that when a lens is focused on one object, other objects—nearer and farther from the lens—may appear in acceptable focus.

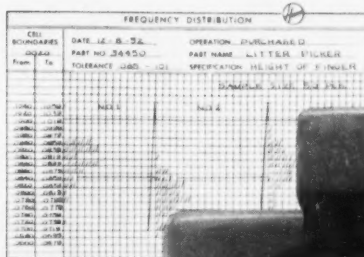
One of the characteristics of this phenomenon of depth of field is that it decreases sharply as magnification is increased. This is equally true when a lens is focused on an actual object, as with a camera, or on an image of that object, as is the case with our contour projector. The result is that when working at higher magnifications depth of field is considerably less than when working at lower powers.

Consequently, it is possible that an object in focus at 10 power may appear out of focus when magnification is changed to 100 power, where depth of field is less and the need for precise focusing correspondingly

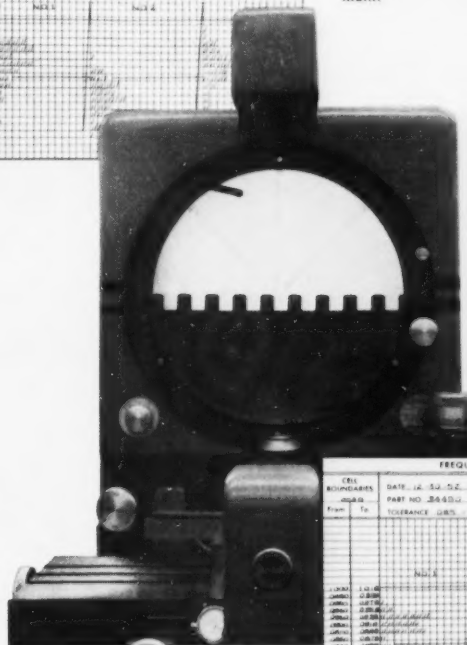


greater. Because of this, we recommend that, when inspecting parts at several magnifications, the part first be focused at the highest magnification to be used. This insures focusing within the narrowest tolerances and, when magnification is changed to a lower power, the part remains in sharp focus on the screen. When this recommendation is followed, complaints on the need for refocusing vanish.

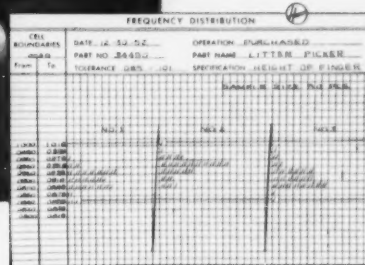
Incidentally, it should be mentioned that neither focus nor depth of field affects accuracy of magnification with the Kodak Contour Projector. This remains as rated irrespective of the precision of focus, thanks to what our optical people call a telecentric stop. Which, in itself, is subject for another in this series of columns.



Frequency distribution chart of part size based on optical measurement.



Frequency distribution chart of part size after tool alterations.



## Saved...296 pieces per thousand!

Like many another manufacturer, the Hoover Company, Canton, Ohio, has its rejection problems. A typical one involved a flexible, rubber-like "litter picker" used in its vacuum cleaners. Although tolerances ranged from .085" to .101", rejects ran as high as 30%.

To solve this problem, Hoover employed a Kodak Contour Projector to measure the parts, plotted results in accordance with modern methods of statistical quality control. Based on these studies, alterations were made in the cutting tool and the holding fixture for the part. Rejects dropped from 30% to less

than 1/4 of 1%. Savings amounted to 296 pieces per thousand.

"Optical gaging with the Kodak Contour Projector," say Hoover engineers, "eliminated incorrect readings caused by mechanical distortion of the parts. In addition, optical methods of measurement proved from 4 to 5 times faster than conventional gaging techniques."

Your own production measurement or inspection problem may similarly be solved by optical gaging with a Kodak Contour Projector. To find out more about it, send the coupon for your copy of "The Kodak Contour Projector."

### EASTMAN KODAK COMPANY

Special Products Sales Division, Rochester 4, N. Y.

Please send me a copy of your booklet, "The Kodak Contour Projector."

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

(Zone)

**Kodak**



# New G Bond



*"Now with a G Bond Wheel we can go completely around a 16-inch face mill,"* writes the tool supervisor of a New Jersey plant. "Previously, due to wheel wear we had to index this type of cutter at four different positions. Now, on a finish cut, we can go completely around,

and the cutter runs absolutely true within .0005 inches. These new G Bond wheels have very good, cool cutting action; don't break down or leave jagged edges . . . We'll be using plenty of them on our tool room jobs."



# sets new record in tool room grinding!

## *Here's Proof . . . Users praise the many* **"TOUCH of GOLD"** *advantages in Norton pace-setting wheels*

Norton G Bond wheels have sure started something! In tool and cutter grinding, as in many other forms of precision and semi-precision grinding, they're giving users an entirely new slant on how efficient, long-lasting and profitable wheels can be.

### *What users say about New G Bond Wheels*

- "Good finish, longer wheel life."
- "Heavier feeds without burn."
- "Run absolutely true."
- "No breakdown — no jagged edges."
- "Cut freely, hold shape with no burning."
- "They show how a real wheel will cut."

In just a few short months the new G Bond has won its place as an important factor in the industrial picture. The most efficient vitrified bond ever produced, it was developed especially for grinding today's tougher tool steels. Norton G Bond ALUNDUM\* wheels cut freer, cooler, faster. They do more work per wheel and cover a wider range of jobs. They hold corners better, are better for form grinding, dress easier and produce more pieces per dressing.

### *G Bond Wheels In Your Own Tool Room*

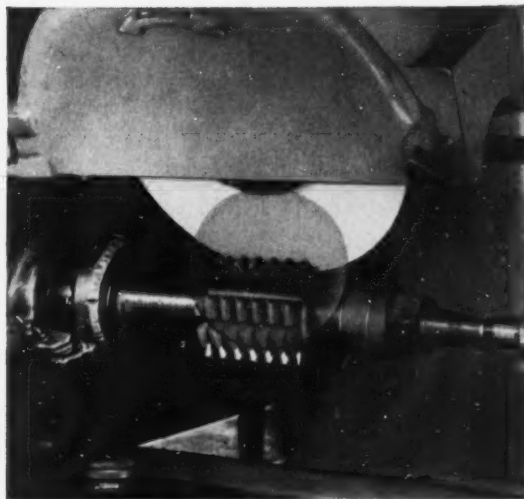
will take heavier cuts in expensive, heat-sensitive steels without drawing temper. They'll reduce tool spoilage, give you closer tolerances and smoother finishes than you ever got before — with fewer wheel changes and machine adjustments . . . Those are the value-adding, money-saving "Touch of Gold" advantages that make G Bond wheels outperform any others you ever used.

### *Your Norton Distributor*

can recommend the right G Bond wheels for your jobs. Contact him or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified 'phone directory. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

\*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

For more information on products advertised, use Inquiry Card, page 245



"Better cut and less burn than previous Norton or other make wheels. We're re-ordering 250 G Bond wheels," was the comment from this Ohio tool company.

### *Norbide Dressing Sticks*



Lengthen wheel life up to 50%. Norbide dressing sticks, of hardest man-made material, last for years, keep your G Bond and other tool wheels in top condition.

W-1530



*Making better products... to make other products better*

MACHINERY, June, 1954—79

**SCULLY  
JONES**

# "Precision

*give you a*

## New "TOOLITROL" speeds setup and tool changes!

Here's a new tool control method that eliminates time-consuming tool adjustments in multiple-spindle machines, and obsoletes the cut-and-try method. You minimize downtime and keep machines operating at near capacity with "TOOLITROL." It co-ordinates your at-the-machine problems of presetting, storing, and changing tools. Scully-Jones "TOOLITROL" is engineered to your job requirements. Cabinets are made of sheet metal, pebble gray finish, mounted on steel benches with hardwood tops. Tool panels are chrome plated and are outlined with metal strips... red to indicate left-hand stations and blue to indicate right-hand stations. Name plates identify tools stored for each machine station. Various types of counters, with or without signal lights, control tool changes. Standard Flush Pin and Height Gages with Gage Plate speed pre-setting tools accurately to your job requirements. Write for Bulletin 19-50.



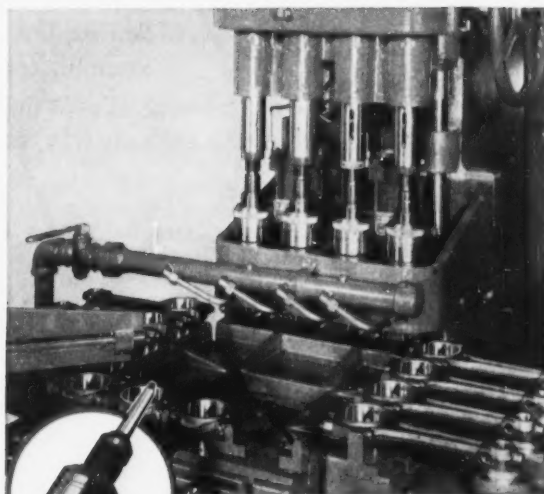
# ***Holding" Tools***

***better, faster setup on every job!***



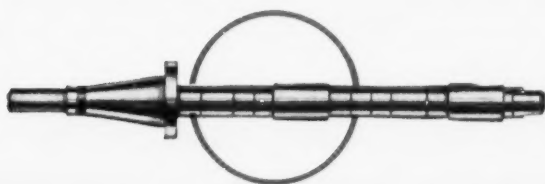
**New Safe-Torque Tap Driver  
reduces tap breakage up to 100%**

At Caterpillar Tractor Co., Scully-Jones Safe-Torque Tap Drivers made possible a 25% cost reduction, 10-12% manpower saving, 5% production increase, and 400% increase in tap life. You can save, too, by controlling adverse tapping conditions with this new adjustable Tap Driver because it releases instantly and completely when torque reaches the danger point. Write for Bulletin 20-50.



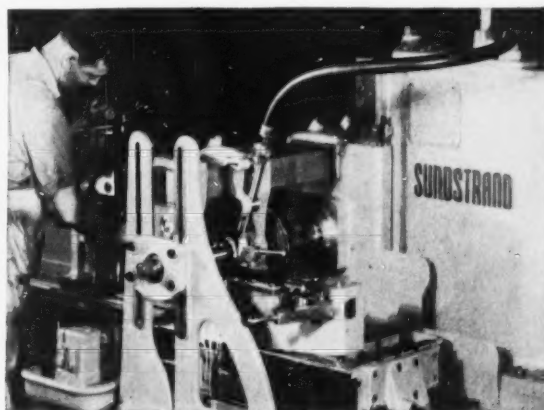
**Chamfers rods on two sides  
in one operation!**

At Studebaker Corp., Scully-Jones Automatic Recessing Tools prove their accuracy and speed. Each cycle they produce two chamfers in four connecting rod bores. The position of cutters for location and depth of cut is controlled within .001". Perhaps you have similar operations you can combine and simplify by using these Automatic Recessing Tools. Write for Bulletin 10-50.



**Rugged Arbors assure long  
tool life at high speeds!**

Rigidity of machine and tooling is a must for gang-milling these tough steel forgings . . . 46 per hour! Sundstrand specified Scully-Jones Style "B" Milling Arbors because they're tough and precision built to run true during fast, heavy cuts. Take the gamble out of milling with Scully-Jones Arbors and Adapters. Write for Bulletin 2-50.



**SCULLY-JONES AND COMPANY, 1906 S. ROCKWELL ST., CHICAGO 8, ILL.**

# ***SCULLY-JONES***

***"Precision Holding" for holding precision***

Call Scully-Jones local representative or distributor—factory-trained "Precision Tool and Work Holding Specialist"—for complete information and service.

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—81

## How Do You Buy Socket Screws?

Many buyers continue to specify some one make by *habit*. They have no particular preference for it, but they think of *all* such fasteners simply as "screws with hex sockets" — *all* makes substantially *alike*.

If you buy that way, and have never tried P-K Socket Screws, just break the habit once, and give them an actual assembly test. You'll get a pleasant surprise.

You'll find that the hex shape of the socket is about the *only* way that other makes and P-K are "alike".

# Look Beyond the Hex —

It pays to *look beyond the socket* when you buy Socket Screws. Compare every detail of product and service. You'll find P-K Socket Screws take top rating in every test. You get exclusive features that simplify and speed up assembly. You get quality matched to a firm guarantee. You get planning and buying information exactly patterned to your needs.

You need *all* these essentials for cost-wise assembly. Why miss out on *any* of them? Just try P-K Socket Screws. Get samples from your P-K Distributor, or write: Parker-Kalon Division, General American Transportation Corporation, 202 Varick St., New York 14.

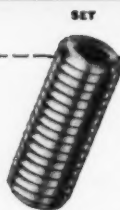
*for all the essentials of cost-wise assembly*

**PARKER-KALON®**



**IN STOCK**

for immediate delivery — see the nearby P-K Socket Screw Distributor —



SET



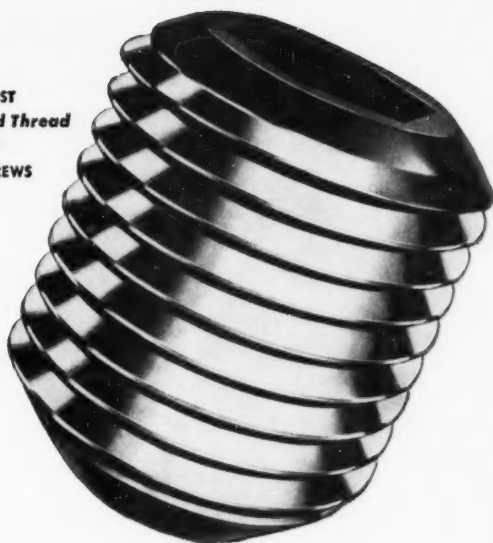
CAP



FLAT HEAD



THE FIRST  
Ground Thread  
SOCKET  
SET SCREWS



THE ONLY  
Size-Marked  
SOCKET  
CAP SCREWS



### In Socket Set Screws PARKER-KALON gives you

- **GROUND THREADS** — at no extra cost. Gage-like precision, mirror-smooth finish — uniform, dependable Class 3 tolerance. Mechanics like their easy starting, easy keying.
- **PROVED ASSEMBLY STRENGTH** The "proving ground" is the millions of assemblies made by thousands of satisfied users of P-K Socket Screws, whose products are used everywhere, many under the toughest conditions of vibration.

### In Socket Cap Screws PARKER-KALON gives you

- **SIZE-MARK** — offered only by P.K. Incised on the head of each screw, it saves time and wasted screws when sizes get mixed up, prevents errors by green help. Maintenance and service men like Size-mark, it helps in reassembling.
- **GEAR GRIP** Meshing firmly with finger tips, it prevents slipping and fumbling when hands are oily, speeds starting.
- **MAXIMUM STRENGTH** Head, socket, and threads are accurately formed by Parker-Kalon's cold-pressure process. Steel structure "flows" to conform to all contours, assures maximum strength at points of greatest stress.

### In all Socket Screws PARKER-KALON gives you

- **GUARANTEED FIRST QUALITY** Based on tests and inspections at every step in production — an exacting routine of quality control supervised by P-K laboratory Technicians.
- **FULL RANGE OF STYLES AND SIZES** You'll find any Socket Screw you need, NC or NF, in P-K's complete line, and Hex Keys in all sizes, and in several handy sets. Ask your P-K Distributor for the P-K Price List, Catalog, — any information you need. Slide chart Socket Screw Dimension Finder Free.

## SOCKET SCREWS

BUTTON HEAD



SHOULDER



PIPE PLUGS



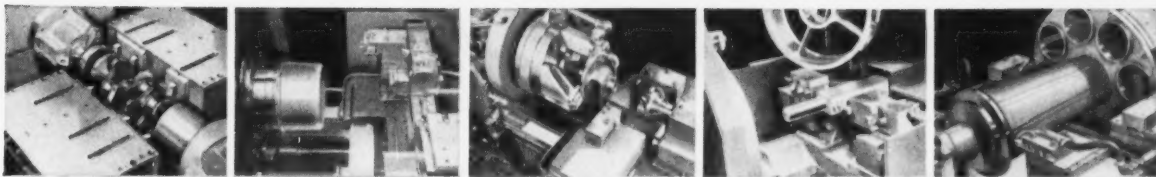
HEX KEYS



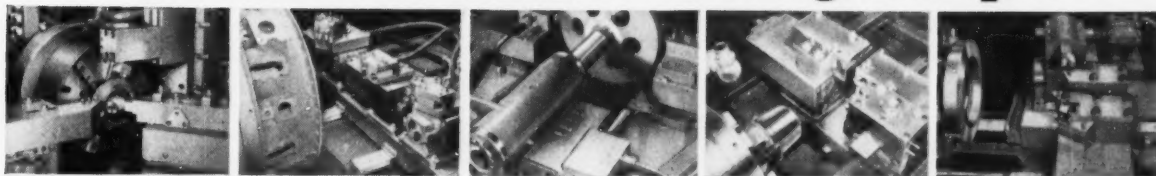
your local Supply and Service Specialist



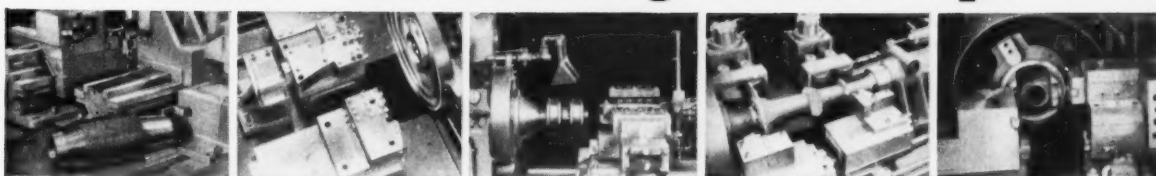




**All these different tooling setups**



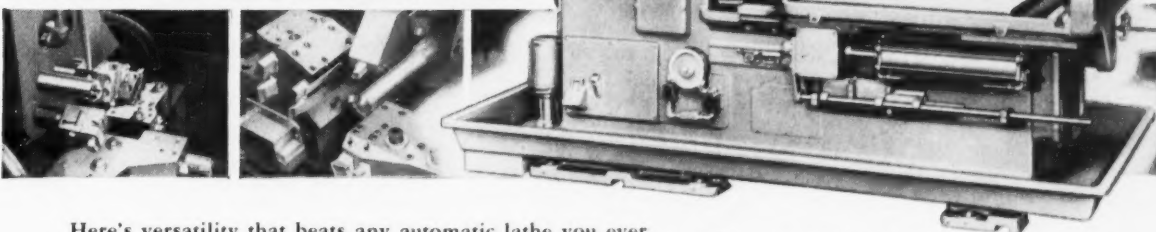
**show the amazing versatility**



**of this fully automatic lathe**



**...the SIMPLIMATIC**



Here's versatility that beats any automatic lathe you ever saw! Actually, the Simplimatic is doing hundreds of jobs like these—jobs that would otherwise be put on *special* machines—built at extra-special cost. But this (and don't miss the important point!) is a *standard machine*—at a *standard price*.

If you have medium or long runs on parts up to 33½" in diameter, get the facts about the Simplimatic Automatic Lathe.

**GISHOLT**  
MACHINE COMPANY  
Madison 10, Wisconsin

**TURRET LATHES • AUTOMATIC LATHES  
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES**



**THE GISHOLT ROUND TABLE**

*represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

**THIS CATALOG** may show you how the Simplimatic can save thousands of dollars for you as it is doing for many others. Write for your copy.

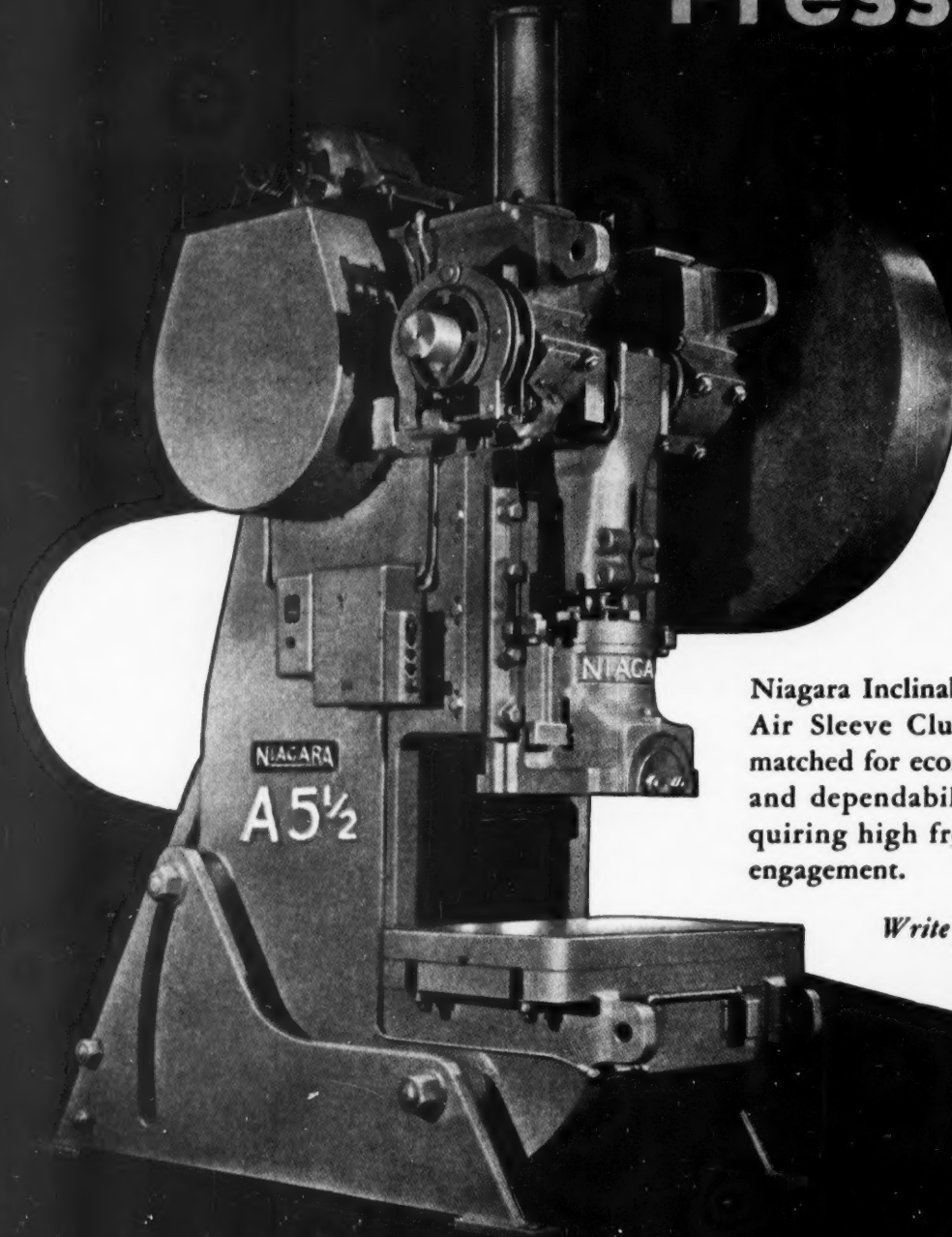


Gisholt Machine Co.  
Madison 10, Wisconsin  
Gentlemen:  
Please send my copy of  
the Simplimatic Catalog.

Name.....Title.....  
Company.....  
Address.....  
City.....Zone...State.....

# NIAGARA

## Inclinable Presses



Niagara Inclinable Presses with Air Sleeve Clutch cannot be matched for economy, efficiency and dependability on jobs requiring high frequency clutch engagement.

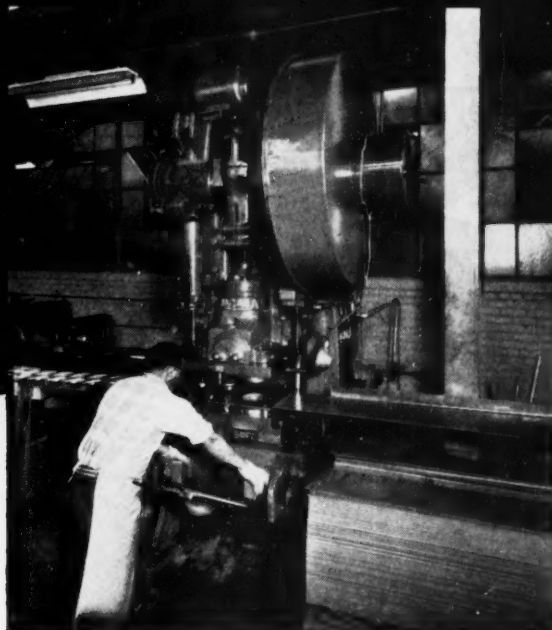
*Write for information.*

**NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.**



# On the Production Line

AT SHWAYDER BROTHERS, INC., DETROIT



1. Punching two round blanks per stroke on Niagara A-5½ Press with Air Sleeve Clutch.



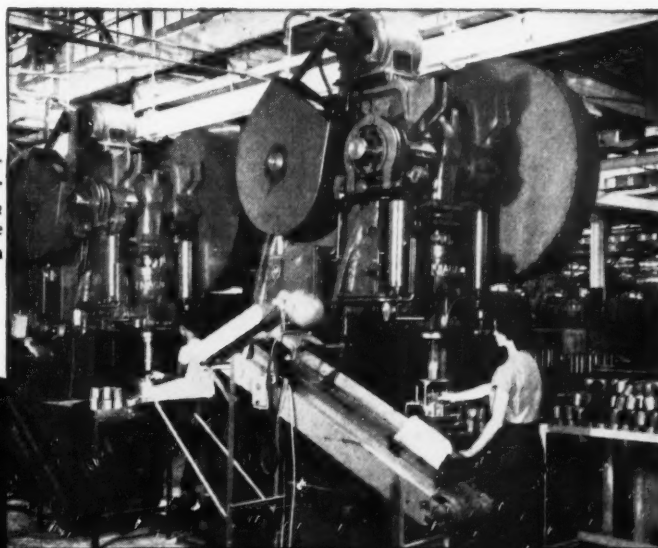
2, 3. Cupping and Re-drawing on A-5½ Presses with Air Sleeve Clutches.



4, 5, 6, 7. Indenting end on A-3½ Presses.



8, 9. Forming hexagonal shape and Ironing side wall on A-5½ Presses with Air Sleeve Clutches and with Niagara Cushions.



The final piercing and tapering operations are done on A-3½ Presses (not shown.)

## NIAGARA

*America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work*

**DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA**

*Dealers in principal U. S. cities and major foreign countries*

No. 2 INDICATOR  
(2 1/4" DIAMETER)

No. 1 INDICATOR  
(1 3/4" DIAMETER)

MIDGET  
(1 1/8" DIAMETER)

*Now... AT YOUR COMMAND*  
**A FULL RANGE OF Dializers®**  
PATENTED

*Dializer*  
instantly converts any  
AGD Adjustable Limit  
Snap Gage Frame (and  
"Standard" Frames  
larger than AGD) to  
DIAL Snap Gages

Conversion is simply a matter of removing a pair of pins from the Snap Gage and inserting Dializer. Range of adjustment remains the same as before conversion.

**You, too, can convert ALL your  
AGD Adjustable Limit Snap Gages  
to Dial Reading Instruments  
*Economically***

ENTHUSIASTIC USERS, impressed with Dializer performance and adaptability, have insisted that we broaden the range of this practical device. In response, we now make available Dializers with a range of indicators from 1 1/8" to 2 1/4" diameter, graduations of .001", .0001", .0005" and .00025", and a wide variety of dial markings, including metric models.

Get acquainted with this economical, easy way of making your Snap Gages more functional, more valuable, more productive . . . at little cost. Write for details.



America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA

Dealers in principal U. S. cities and major foreign countries

## The Sharper Your Pencil ...the better!

Cost-minded men know that what they pay for a gear has little to do with how much it ultimately costs. Today's initial price is one thing. Performance price, computed five years from now, is something else again.

Frankly, "Double Diamond" Gears aren't built to save you a few pennies today. They're engineered and manufactured to save you *dollars* in low installed cost, satisfactory performance and minimum service requirements *over the years*.

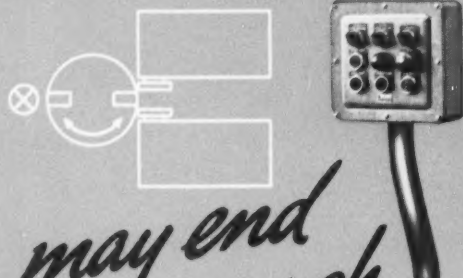
Have you sharpened your pencil for that kind of economy? True, long-haul economy? Then write.



FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS  
GEAR-MAKERS TO LEADING MANUFACTURERS

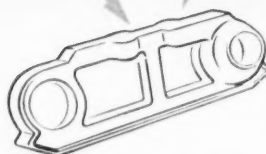
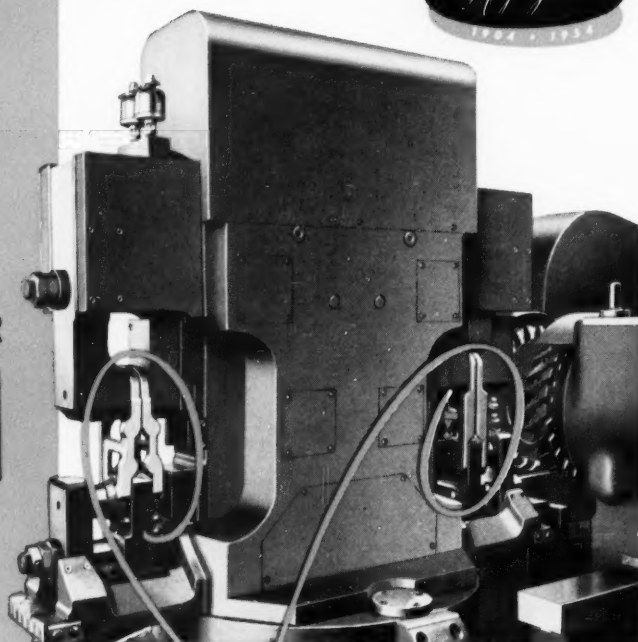
# Duplex Milling

as Engineered by  
**MOTCH & MERRYWEATHER**



*may end  
your search*

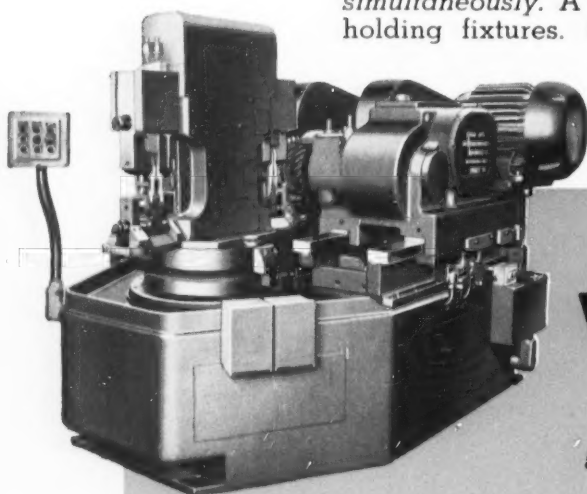
*Fifty Years*  
1904 - 1954



Both sides of tractor side bars are face milled. Production is 240 pieces per hour using high speed steel cutters.

## PRODUCTION CAN BE RAISED 50% by Motch & Merryweather's Duplex Milling Method!

- Production milling is given new meaning by Motch & Merryweather's duplex method. Two heads mill two parts *simultaneously*. A table indexing 180° has two sets of work-holding fixtures. One operator unloads and loads during *duplex milling* at the opposite fixture. Fully automatic operation sets new production limits. Consult Motch & Merryweather about your production milling.



**THE  
MOTCH & MERRYWEATHER  
MACHINERY CO.**

MACHINERY MANUFACTURING DIVISION  
CLEVELAND 13, OHIO

*Builders of Circular Sawing Equipment, Production Milling, Turning and Special Machines*





## CUTLER-HAMMER

### believes in keeping modern through an adequate replacement program

"Cutler-Hammer has 30 major production centers in its multiplant operations. The machines required by these centers vary greatly as to type and characteristics. Some are standard machine tools and others are special-purpose machines designed and built in our own shops.

"We are firm believers in the need for keeping our facilities modern and endeavor to allocate our appropriations for new equipment on a sound basis.

"Each year the foremen survey their departments and make replacement recommendations to their superintendents. Recommendations may also originate in the tool, method, or engineering departments. These recommendations are then assembled in a central location where they are evaluated, taking into consideration all known factors in each particular case which could significantly affect the decision. Any improvements in quality and available savings are given great weight in making the decision to confirm or reject any recommendation.

"If the recommendation is confirmed, a request for the necessary appropriation is sent to a management committee for final approval. This committee receives a summary of the study which has been made, and the appropriation is granted or denied based on the committee's review of this study."

**G. S. CRANE, President**  
**CUTLER-HAMMER, INC.**  
**MILWAUKEE, WISCONSIN**

**ROCKFORD  
INSERT  
GROUP**

**Keep gathering metal-working production ideas... be  
well informed when the time for replacement arrives...**

June, 1954



## **Mattison Grinder beats old time (15 hours) by 12 hours**

The picture above shows a punch and die grinding operation on a Mattison High-Powered Precision Surface Grinder at Lyon Metal Products, Incorporated. Previous time on a converted planer-grinder was 15 hours — now with a Mattison Grinder equipped with special fixture, grinding time has been reduced to 3 hours.

Mattison Grinders are proving profitable investments in plants where "time out" for reconditioning is a vital factor in meeting production schedules. Surfaces are reconditioned and edges sharpened in a minimum of time, eliminating costly delays and holdup of production. Many manufacturers installing the Mattison Grinder for reconditioning dies find many other uses for it in grinding flat surfaces where accuracy and fine finish are required. For complete information on the Mattison High-Powered Precision Surface Grinder, send for free copy of our latest circular.

**MATTISON** **MACHINE WORKS**  
ROCKFORD • ILLINOIS

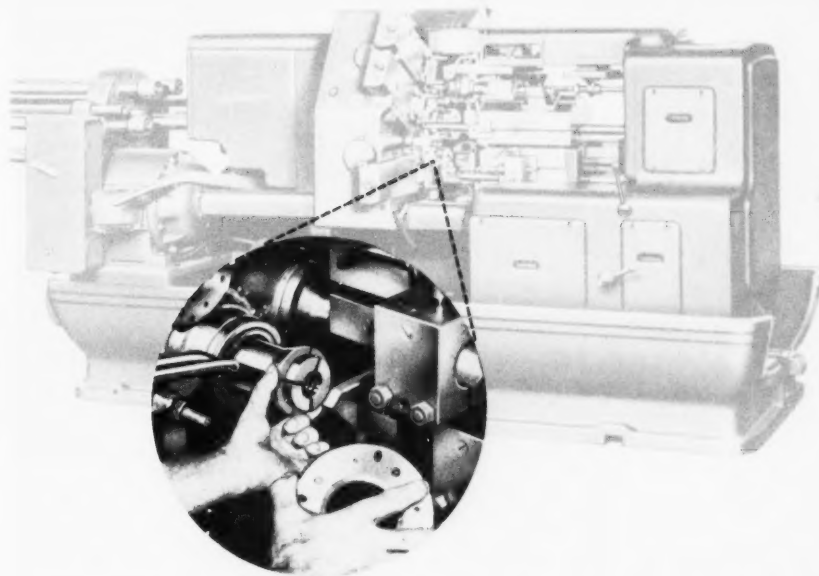


Machinery, June, 1954

MACHINES DESIGNED TO MEET YOUR NEEDS **ROCKFORD, ILLINOIS, U.S.A.**

# GREENLEE

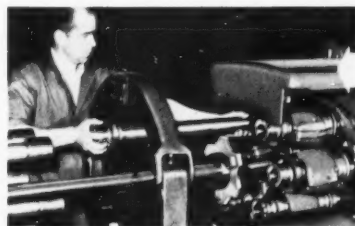
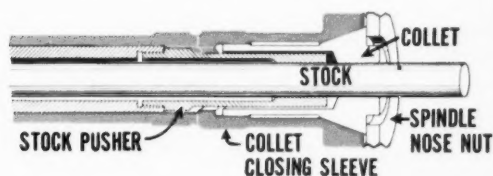
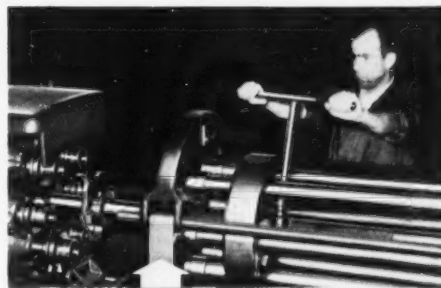
## Automatics



**COLLET AND  
FEED FINGER  
ARRANGEMENT**

**REDUCES  
SET-UP  
TIME**

All six collets and feed fingers can be quickly and easily changed without indexing the spindle carrier. The collets are changed by simply removing the spindle nose nut. Greenlee collets are operated, as illustrated in the drawing, by the action of a sliding sleeve over the taper of the collet. The nose nut holds the collet in a fixed position inside the spindle, thus eliminating any endwise movement. As a result, none is transmitted to the stock, and this provides for accurate stock feed-out.



#### CHANGING PUSHER TUBES

A few turns of a wrench moves the head of the stock-reel backward to afford the operator plenty of room to change the stock pusher tube assemblies, after releasing and indexing retainer plate.



**GREENLEE BROS. & COMPANY, 1866 MASON AVE., ROCKFORD, ILL.**

*Write for FREE  
Literature*



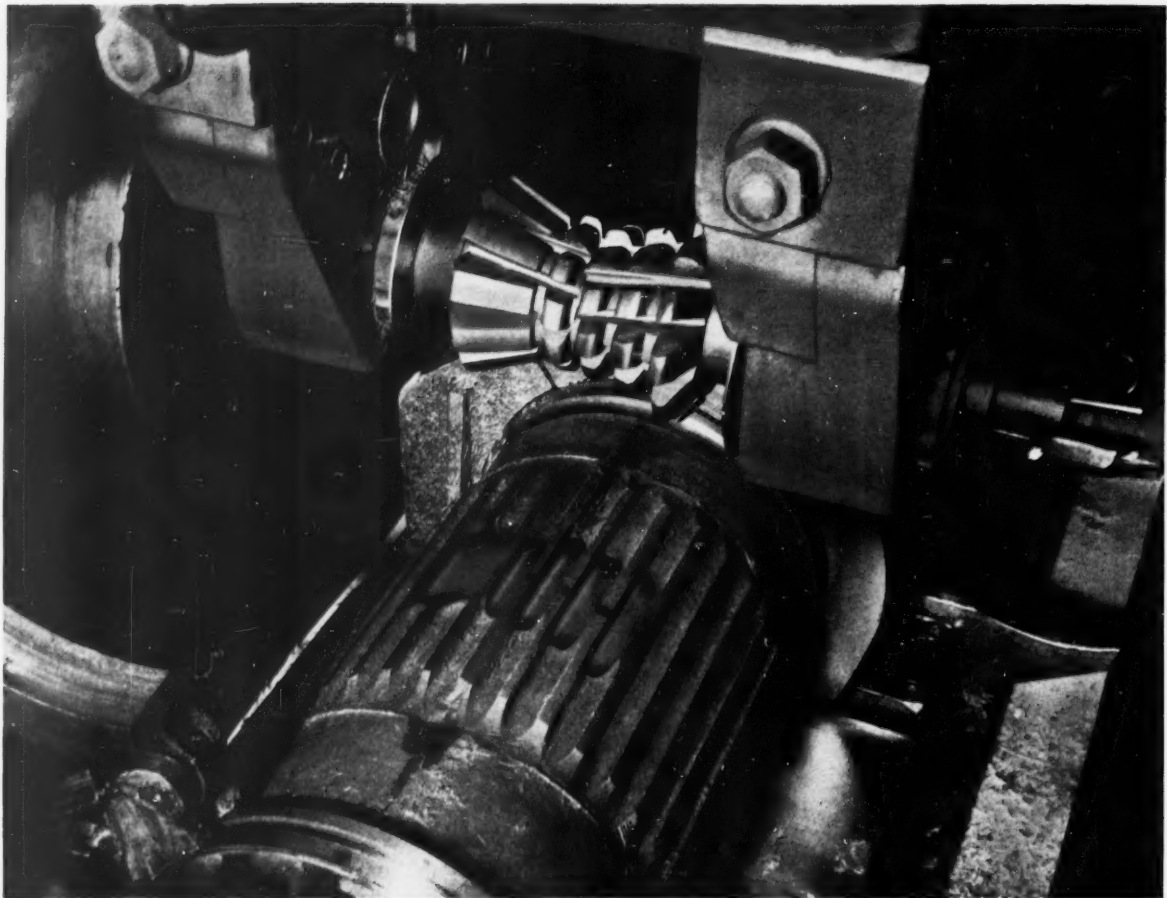
MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

Machinery, June, 1954

FOR PRODUCTION MACHINE TOOLS IT'S

**ROCKFORD, ILLINOIS, U.S.A.**





## BARBER-COLMAN FORM CUTTER DESIGN LESSENS CHATTER AND VIBRATION

Helical Teeth Provide  
Continuous Cutting Action

Shearing action of these Barber-Colman helical-fluted form cutters not only reduces chatter and vibration to a minimum, but also improves tool life and production on this milling job.

Gang-type cutters are recommended because they combine several operations in a single cut, and also because individual sections are interchangeable for other gang operations. Due to the type of cut and non-uniform material, some sections receive more wear than others and require more frequent replacement. With the gang arrangement, section replacements can be ordered singly, thereby reducing tooling costs.

Redesign of the cutters for this job included the adoption of helical teeth recommended by Barber-Colman Engineers. These helical teeth provide continuous cutting action and have eliminated chatter in the cut.

B U I L D E R S     O F     P R E C I S I O N     G E A R



Machinery, June, 1954

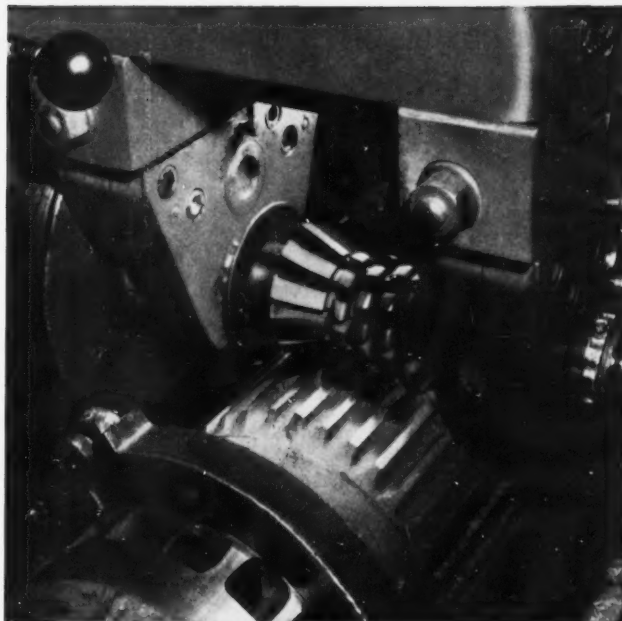
CENTER OF MACHINE-TOOL EXCELLENCE

**ROCKFORD, ILLINOIS, U.S.A.**



### GOOD TOOL LIFE IN NON-UNIFORM MATERIAL

These cylinder liners are milled on two surfaces, 180° apart, using a feed of  $\frac{3}{4}$ " per minute and cutter speed of 123 RPM. Cutters are  $4\frac{1}{2}$ " diameter x 5.477" overall length, with helical teeth, and are fed radially to depth. The cast-steel liners are non-uniform in structure, and frequent hard spots are encountered. Production is 5 sleeves per hour compared with 2 per hour obtained with former straight-fluted cutters. Tool life averages 35-50 pieces per sharpening, depending upon the consistency of the material. There is no evidence of chatter or rapid wear as experienced with straight-fluted cutters.



### EXTRA QUALITY AT NO EXTRA COST

Barber-Colman form-relieved cutters are checked within close tolerances for true concentricity and accurate index throughout each manufacturing step. This quality control requires extra operations and closer manufacturing inspection. No extra charge is made for this accuracy since Barber-Colman Engineers want to be sure that the proper degree of accuracy is present in all form cutters.

As a result of this accuracy, Barber-Colman form-relieved cutters do not require cylindrical grinding and "spot sharpening" in order to properly recondition them. They are simply and easily face-sharpened on any sharpening machine having controlled indexing. Consequently, they have low maintenance costs.

We would like to show you the superior cutting performance of this type of accuracy on your next production milling operation. Send us prints or samples for analysis and estimate on any form-relieved cutter application.



HOBS • CUTTERS • REAMERS  
HOBBING MACHINES  
HOB SHARPENING MACHINES



## Barber-Colman Company

GENERAL OFFICES AND PLANT, 828 ROCK STREET, ROCKFORD, ILLINOIS

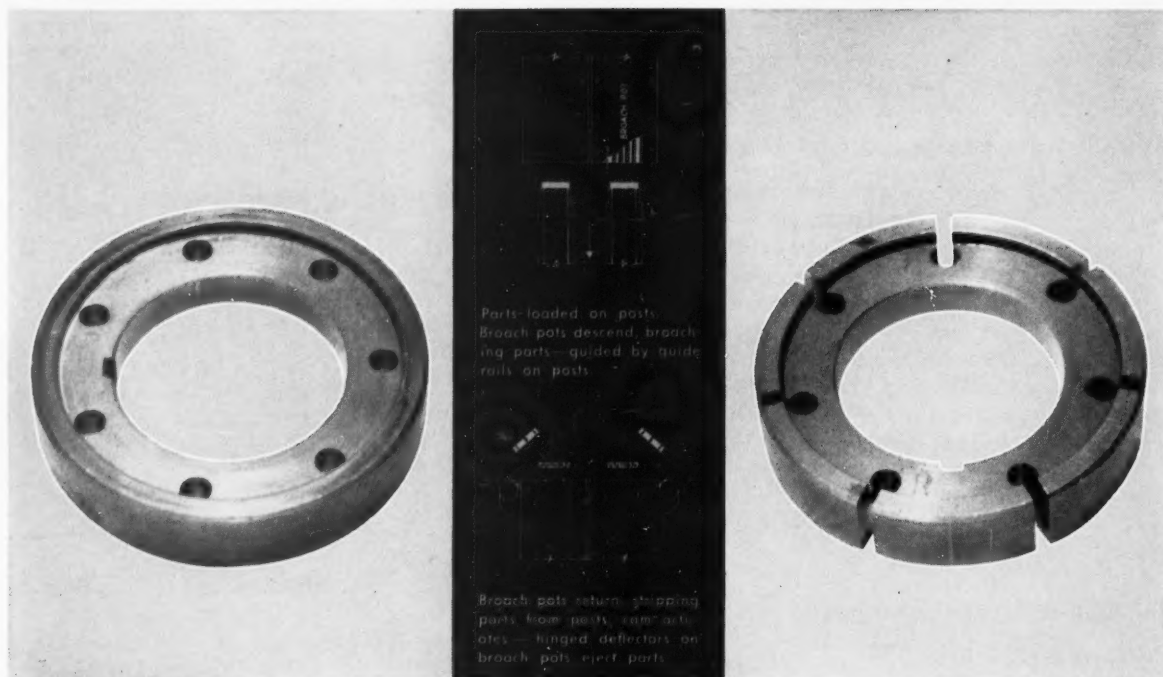
H O B S     A N D     M A C H I N E S     S I N C E     1 9 1 1

Machinery, June, 1954

CITY OF MACHINE-TOOL SPECIALISTS **ROCKFORD, ILLINOIS, U.S.A.**



ANOTHER *American* FIRST



## an *American* "special" broaches

7 slots each pass; 320 parts per hour

Seven external slots are broached on a pump rotor part by this American special two-station 42" stroke, 10-ton broaching machine. Fixtures are designed as posts fixed to the machine base and contain guides for guiding the moving broach pots during the machine stroke.

The operation is very simple—the operator loads two parts and starts the broaching cycle. Safety wedges, which prevent the broach pots from moving down while the operator loads, retract and the broach pots move down broaching the parts. On the return stroke the ejector mechanism



strips the parts from the posts and then flips the parts to the side as the broach pots move up. The operator reloads and the cycle repeats, producing 320 parts per hour, when operating at 100% efficiency.

You can benefit from the American-Way when you want high production at low unit cost. Send a part print or sample for the recommendations of the company that engineers and builds all three — broaching machines, broaches and broaching fixtures. Write today. There is no obligation.



*American* BROACH & MACHINE CO.  
A DIVISION OF SUNSTRAND MACHINE TOOL CO.

American Building - Ann Arbor, Michigan

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



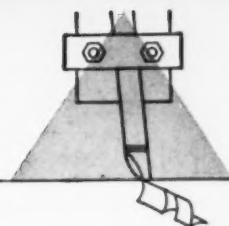
Machinery, June, 1954

CENTER OF MACHINE-TOOL EXCELLENCE

ROCKFORD, ILLINOIS, U.S.A.

how much does an openside shaper cost?

rockford hydraulic-driven 36" openside



# shaper



you may be **surprised to know** . . . . . that you can buy the 36" Openside Shaper for little more than the cost of a ram-type shaper.

Yet the 36" openside offers the advantages of planer accuracy and easy set-up, in addition to production flexibility. The standard machine complete with electrical equipment can be bought for as little as \$9,035.00. Side head, hydraulic tool lift and other accessories are extra at popular prices. Similar machines are also built in 48", 60" and 72" table lengths and priced accordingly. Consult your Rockford Machine Tool Co. representative for full details or write direct.



Get this handy time calculator for use in estimating machining time for shaping and planing operations. Request on company letterhead will bring one promptly.



**ROCKFORD MACHINE TOOL CO.**

2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

Machinery, June, 1954

FOR PRODUCTION MACHINE TOOLS IT'S **ROCKFORD, ILLINOIS, U.S.A.**



# DIFFERENT WORKPIECES PROCESSED ON ONE W. F. & JOHN BARNES SPECIAL MACHINE

## Versatile Tooling and Special Machine Precision Lower Costs, Improve Quality of Motor Grader Transmissions

This W. F. & John Barnes unit, designed and built for the J. D. Adams Manufacturing Co., Indianapolis, Ind., combines all the built-in advantages of a special machine . . . yet it machines not one, but FIVE separate and dissimilar workpieces that together form a complete transmission housing. Ingenious planning of spindle arrangement, tooling, and fixtures enables only 31 spindles to perform a total of 53 operations on the five workpieces. Special fixtures and numbered gauges locate the work and tooling quickly and accurately . . . complete change-over from one housing section to another averages only six hours.

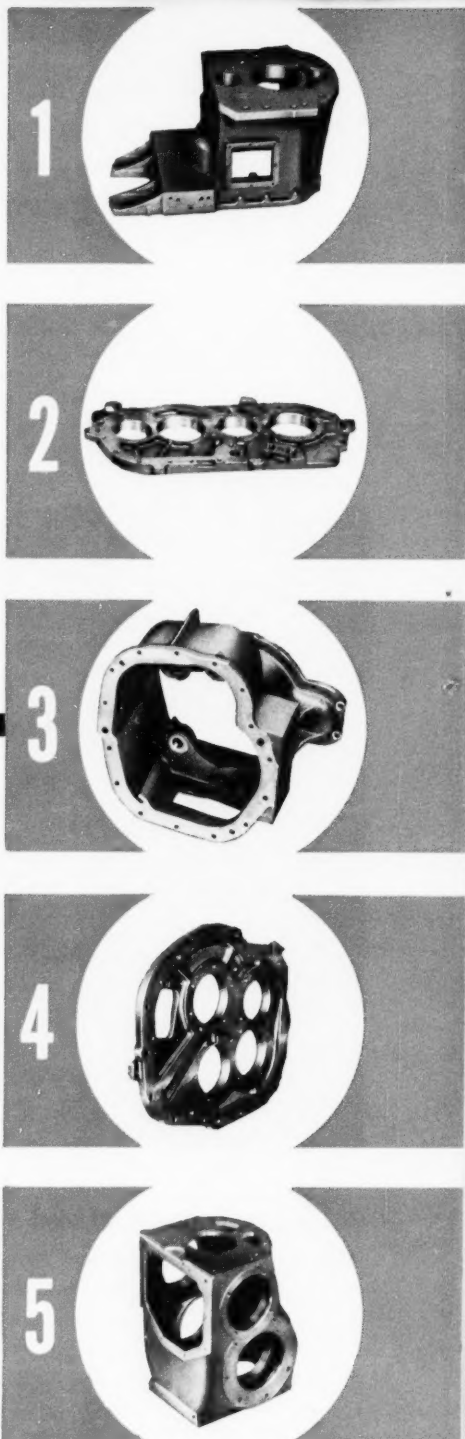
Engineering and building a distinctive machine like this just doesn't happen by accident . . . it's the result of over 75 years of accumulated knowledge in a highly specialized field. That's why at Barnes you'll find the creative skills, plus complete and adequate facilities, for designing and building better machines to lower your production costs . . . improve product quality.

### ASK FOR AN ANALYSIS OF YOUR PRODUCTION METHODS

Find out how Barnes' unique creative and specialized resources can help you cut costs. Your problem will be given expert and individual attention.



**BUILDERS OF BETTER MACHINES SINCE 1879**  
**MULTIPLE SPINDLE DRILLING • BORING • TAPPING**



Machinery, June, 1954

**MACHINES DESIGNED TO MEET YOUR NEEDS ROCKFORD, ILLINOIS, U.S.A.**



## LOWER TRANSMISSION CASE

2 Operations

6 Operations



Drawings illustrate the spindle arrangement in the opposed heads and how they are individually tooled to perform chamfering, rough, semi-finish and finish boring, and facing operations in the five different workpieces. Two auxiliary heads mounted at right angles to the machine bore dowel holes in the Final Drive Housing.

## INTERMEDIATE PLATE

3 Operations

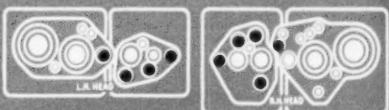
10 Operations



## UPPER TRANSMISSION CASE

8 Operations

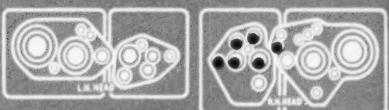
10 Operations



## UPPER TRANSMISSION CASE COVER

10

6 Operations

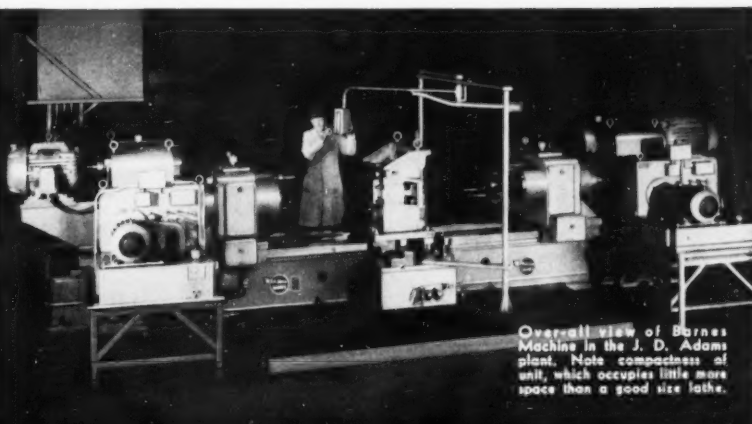
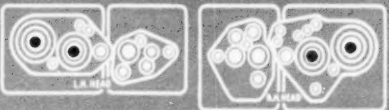


## FINAL DRIVE HOUSING

2 Operations

3 Operations

AUXILIARY HEADS COMPLETE 2 OPERATIONS AT RIGHT ANGLE TO REGULAR MACHINE SPINDLES



Overall view of Barnes Machine in the J. D. Adams plant. Note compactness of unit, which occupies little more space than a good size lathe.



Closeup of fixture used for Upper Transmission Case. Note rings for quick removal. Spindle housings are divided and gear boxes separated from housings to minimize heat rise.

## INVESTIGATE BARNES' 6-POINT MACHINE TOOL BUILDING SERVICE . . .

A Coordinated Creative Engineering and Manufacturing Service designed to help you solve problems quickly and efficiently. Write today for your free copy of "Coordinated Machine Engineering".



**W. F. & JOHN BARNES COMPANY • 310 SOUTH WATER ST., ROCKFORD, ILLINOIS**  
**MACHINES • AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES**

Machinery, June, 1954

CITY OF MACHINE-TOOL SPECIALISTS

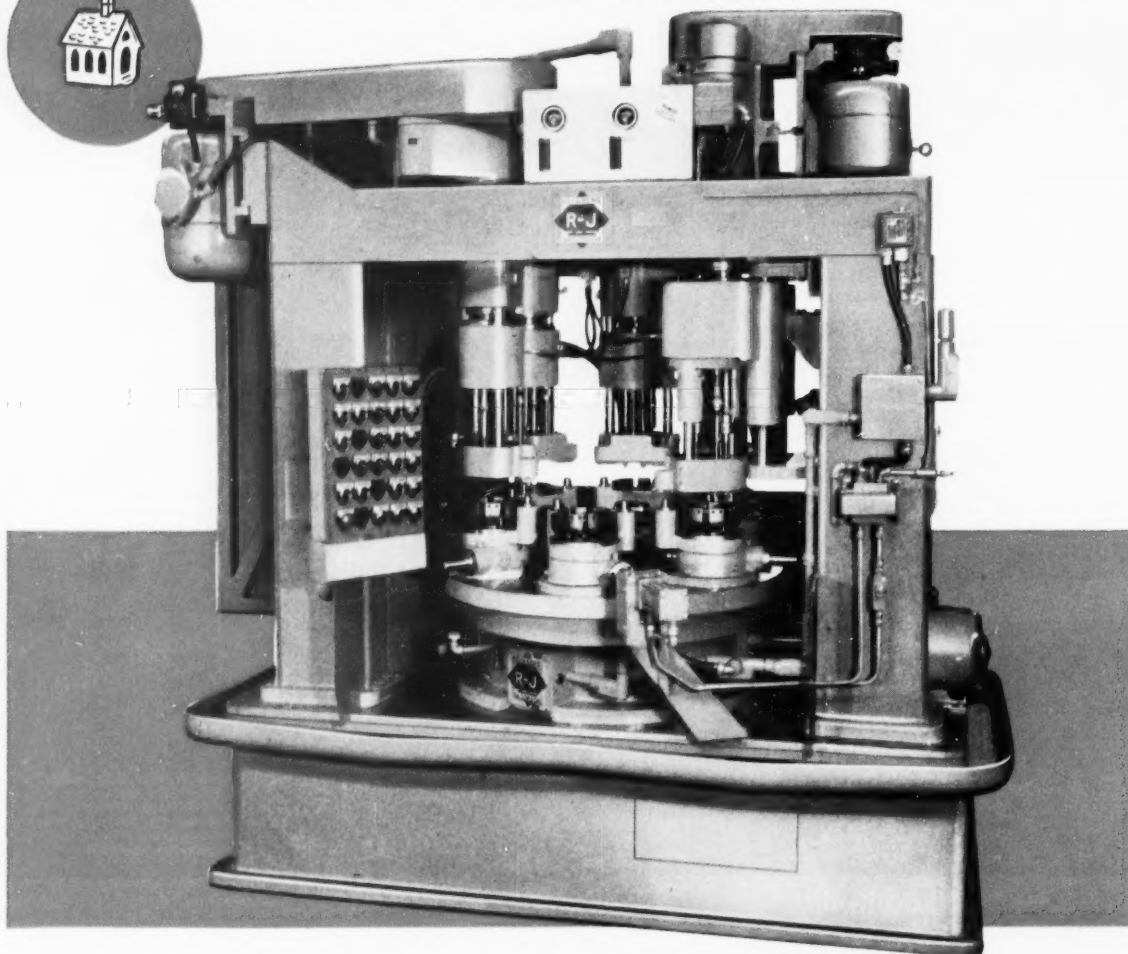
**ROCKFORD, ILLINOIS, U.S.A.**



# Rehnberg-Jacobson



"BUILT LIKE A LITTLE BRICK CHURCH..."



## BRIDGE-TYPE DESIGN OFFERS ADVANTAGES

On a machine of this kind, the powered units are supported on a very strong and rigid bridge-like structure over the index table. In comparison with a center-column arrangement, the bridge permits use of a less-costly standard index unit and provides greater overall stiffness for accurate work. In comparison with a single-column arrangement, the bridge permits use of a variety of separate units in place of all spindles in one unit. The use of separate units, which can

be positioned almost anywhere required, provides extreme versatility of arrangement — and easy re-arrangement to accommodate engineering changes or to salvage the machine for adaptation to other work. Separate units also permit independent adjustments of feeds and speeds as desired. ALL-MECHANICAL Rehnberg-Jacobson Drill, Tap, and Index Units combine to form a production machine that is easy to operate, easy to service, and easy to understand.

**REHNBERG-JACOBSON MFG. COMPANY**

DESIGNERS & BUILDERS OF  
SPECIAL MACHINERY



2135 KISHWAUKEE ST.  
ROCKFORD, ILLINOIS



Machinery, June, 1954

CENTER OF MACHINE-TOOL EXCELLENCE

**ROCKFORD, ILLINOIS, U.S.A.**

EQUIPPED WITH SPIN-GRINDING ATTACHMENT...

**NEW INGERSOLL CUTTER GRINDER  
SAVES 440 HOURS PER YEAR!**

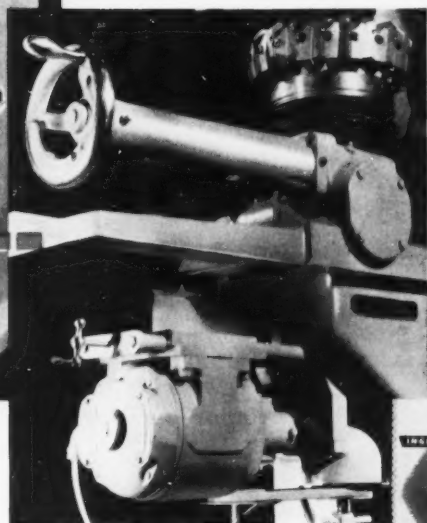


Day-by-day use of new Ingersoll Cutter Grinders in our own plant shows:

30 MINUTES SAVED in grinding 14" Ingersoll Extra Heavy Duty Shear Clear Face Mills with 16 new, carbide-tipped blades.

18 MINUTES SAVED in grinding 6" Ingersoll Heavy Duty Shear Clear Face Mills with 12 new, carbide-tipped blades.

*Average Saving of 22% when spin-grinding cutter blades to equal height before sharpening . . . 440 hours in a year of 40-hour weeks . . . double that amount on a two-shift operation.*



The Spin-Grinding Attachment converts the new Ingersoll Cutter Grinder into a cylinder grinder which will quickly grind all blades to uniform height on both face and periphery before normal back-off operations.

*Price of the New Ingersoll Cutter Grinder, Complete with Spin-Grinding Attachment, is only \$4,130.*

Write Today for New  
Cutter Grinder Manual 62B



THE

**INGERSOLL**

MILLING MACHINE COMPANY

ROCKFORD, ILLINOIS, U.S.A.

BUILDERS OF SPECIAL DESIGN MILLING & BORING MACHINES

ORIGINATORS OF *SHEAR*  
*CLEAR* CUTTERS

Machinery, June, 1954

FOR PRODUCTION MACHINE TOOLS IT'S **ROCKFORD, ILLINOIS, U.S.A.**






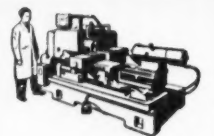
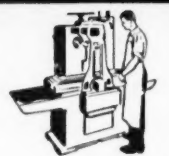
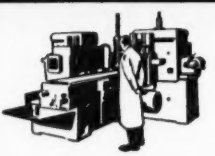
# NEW!



## Single End Milling and Centering Machine for Small Lot Work

Here's an ideal machine for the steel stock room or lathe department for miscellaneous small lot shaft work. This new Sundstrand single end milling and centering machine automatically maintains a definite relation between the ends and centers. Combined milling and centering is more accurate than conventional methods as it

is not necessary to re-chuck the work between the milling and centering operations, and the centers are held square with the end of the shaft. Combining the operations also saves the handling time and the floor space ordinarily required for a second, or more expensive machine. The model shown above handles work from  $\frac{3}{4}$ " to

	<p><i>"Engineered Production" Service*</i></p> <p><small>*REG. U.S. PAT. OFF.</small></p>	<p>AUTOMATIC LATHES</p> 	<p>SIMPLEX RIGIDMILS</p> 	<p>DUPLEX RIGIDMILS</p> 
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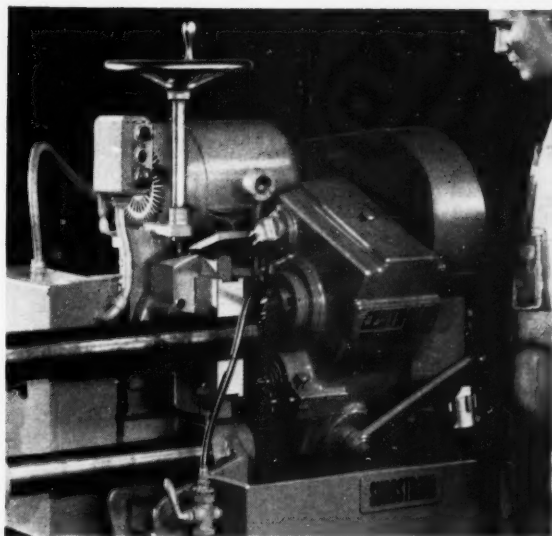


Machinery, June, 1954

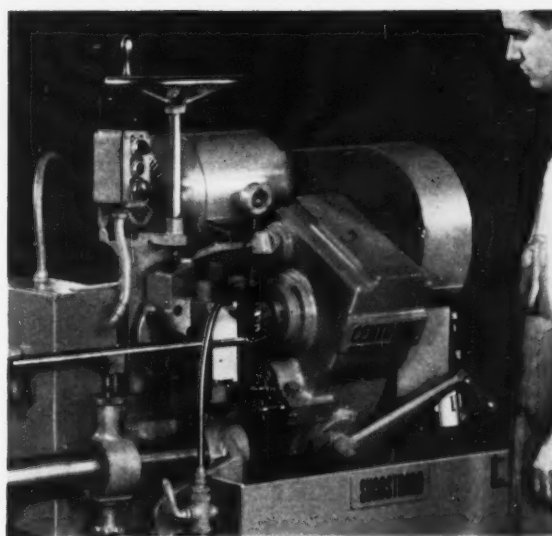
CENTER OF MACHINE-TOOL EXCELLENCE

**ROCKFORD, ILLINOIS, U.S.A.**





Close up of the milling operation on a large diameter shaft.



Close up of the milling operation on a small diameter shaft.

$3\frac{1}{2}$ " diameter by 5" to 48" long. Special work supports can be provided to accommodate longer shafts. If your work is larger than  $3\frac{1}{2}$ " diameter, specify maximum diameter and length of shaft.

### 65 Out of 105 Minutes Saved On Lot of 40 Workpieces

In addition to being accurate, the CENTRMIL is fast. Just a few simple adjustments and the machine is ready for individual pieces or small lots. A typical example shows one manufacturer saving 65 out of 105 minutes on a lot of 40 pieces compared to previous method of facing to length and centering.

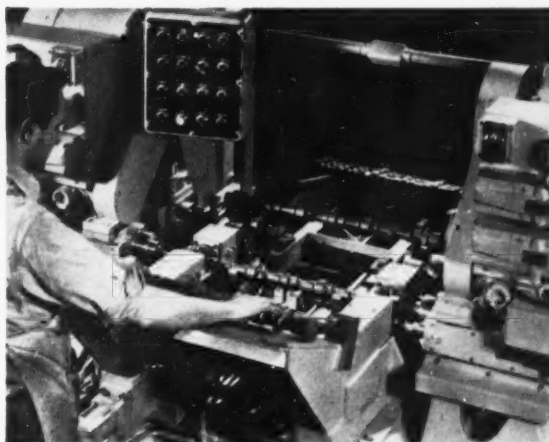
**Free  
Data**

Write for more detailed description and specifications on this new Sundstrand single end milling and centering machine. Ask for bulletin 644.

### For Higher Production Work

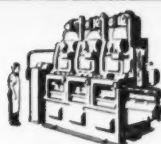
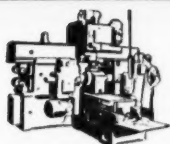
#### DOUBLE END MACHINES

Double end CENTRMILS are available for higher production requirements. Both ends of the workpiece are milled and centered simultaneously. For instance, the machine illustrated below mills and centers 100 camshafts per hour. The machine is front loaded from a hopper and automatically unloaded at rear. It is also provided with automatic clamping.



TRIPLEX RIGIDMILS

SPECIAL MACHINES



## SUNDSTRAND Machine Tool Co.

2530 Eleventh St. • Rockford, Ill., U.S.A.

Machinery, June, 1954

CITY OF MACHINE-TOOL SPECIALISTS

**ROCKFORD, ILLINOIS, U.S.A.**

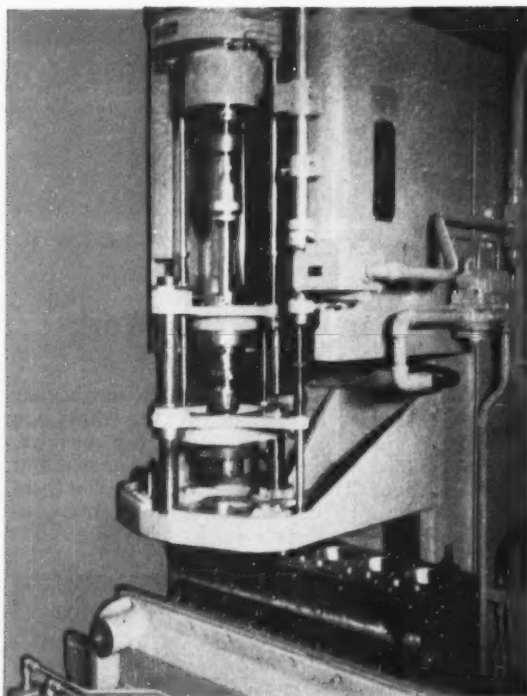


precision Size Control • higher Production

## HONING CYLINDER BLOCKS

with **BARNESDRIL**

**Plugmatic Bore-To-Bore Sizing • Electronic Hone Expansion • Extra Deep Stones**



Utility — Single Spindle — Full Automatic, High Production Honing.

- Duplex 520 Honer  
For honing V-blocks, all bores simultaneously.
- Vertical 320 Honer  
For honing in-line blocks, all bores simultaneously.
- Vertical 305 Honer  
For utility honing cylinder bores, one at a time with fully automatic cycle.  
Quickly convertible for various diameters and bore spacings.

Write or phone for a Barnesdril honing engineer to assist you with any honing problem. Ask for Bulletin No. 500.

### Greater Precision

Plugmatic gauging member sizes the work being honed. Is self-aligning and is not affected by misalignment or eccentric stone wear. Provides consistent automatic sizing on cylinder block bores within .0005 on the diameter from bore to bore.

### Higher Production

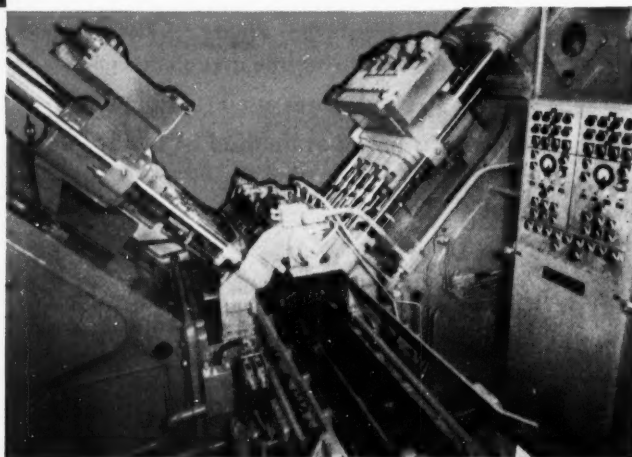
Automatic electronic control of hone expansion and compensation for stone wear keeps honing operations at peak efficiency. Extra-deep quick-loading stones provide longer abrasive life . . . quicker stone changes . . . less machine down-time.

### Selected Finish

With electronic hone expansion control, the finish is accurately determined by the selection of the proper rate of feed and grit, grade and bond of abrasive stones.

### Increased Stone Life

"Extra-deep" Plas-T-Clad stones provide 200 to 500% more usable abrasive . . . positive support closer to the cutting edge . . . and freer-cutting action.



High Production Multiple Spindle Honing



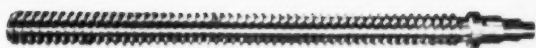
**BARNES DRILL CO.**

820 CHESTNUT STREET • ROCKFORD, ILLINOIS

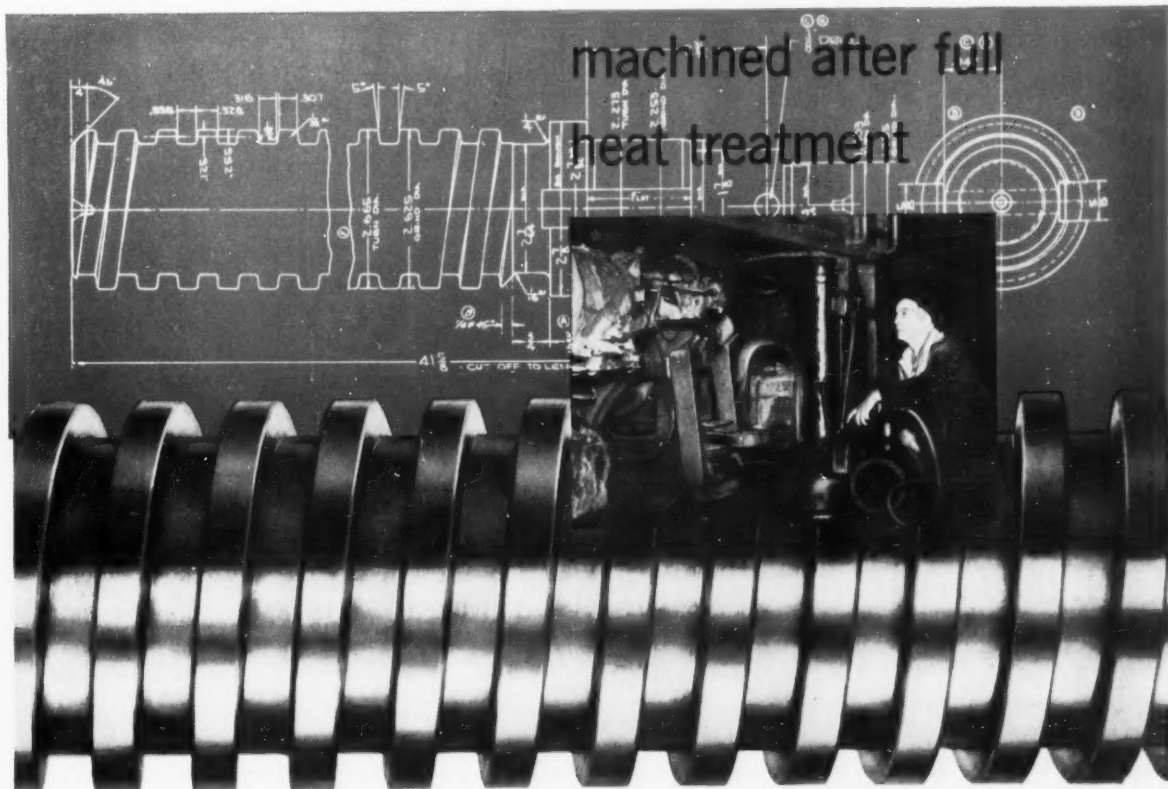


Machinery, June, 1954

MACHINES DESIGNED TO MEET YOUR NEEDS **ROCKFORD, ILLINOIS, U.S.A.**



# MAX-EL alloy steel part for 100-ton jack



The Max-el part shown above is the lifting screw from a Duff-Norton air motor screw jack. It's the part that actually lifts and holds the load . . . up to 100 tons.

To make the part, blanks are cut from Max-el  $3\frac{1}{2}$  bar stock. After heat treating to 321-341 Brinell, threads are chased and all machining performed. Max-el's optimum machinability after heat treatment, its high-strength, toughness, deep hardenability — which prevents thread sinkage, and high surface finish make it an ideal choice for this rugged application.

But try Max-el yourself. Its excellent machinability means longer tool life, more pieces per grind. And you'll appreciate its freedom from distortion and superior quality. For immediate delivery of Max-el call your nearest Crucible representative.



## CRUCIBLE

first name in special purpose steels

54 years of *Fine* steelmaking

## ALLOY STEELS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

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For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—105

# CUMBERLAND GROUND BARS

We manufacture 8" diameter, 7-1/2", 7", 6-1/2", 6", and also odd and intermediate sizes down to and including 1-1/8".

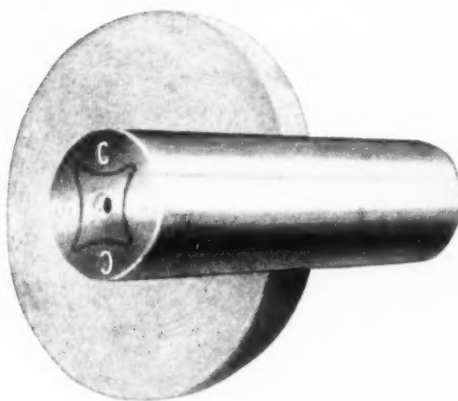


ON THE WEST VIRGINIA SHORE, OVERLOOKING THE POTOMAC RIVER, STANDS THE JAMES RUMSEY MONUMENT

The first practical steamboat in the world was run on the Potomac River a few miles below Cumberland, Maryland.

GEORGE WASHINGTON said in his diary, under date of September 6, 1784: "Remained at Bath all day and was shown the Model of a boat constructed by the ingenious Mr. Rumsey, for ascending rapid currents by mechanism; the principles of this were not only shown, and fully explained to me, but to my very great satisfaction, exhibited in practice in private under the injunction of secrecy—"

At a later date GEORGE WASHINGTON said in his diary: "Spent the afternoon with Mr. Rumsey and then Alexander Hamilton and I rode on to Cumberland, Maryland."



## Symbol of Quality

Approximately 100 years after the exhibit of this steamboat, Cumberland began grinding bars. They found through experience this was the best method by which accurate steel bars could be produced. These bars are so carefully ground that they are adapted for mass production where gears, pulleys, sprockets and bearings must slide on the bars without delay due to filing or fitting.

## IMMEDIATE BARS

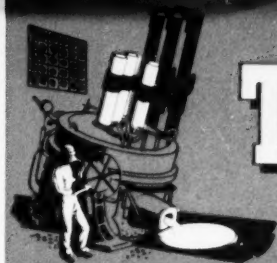
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**CUMBERLAND STEEL COMPANY**

**CUMBERLAND, MARYLAND, U. S. A.**  
ESTABLISHED 1845 INCORPORATED 1892





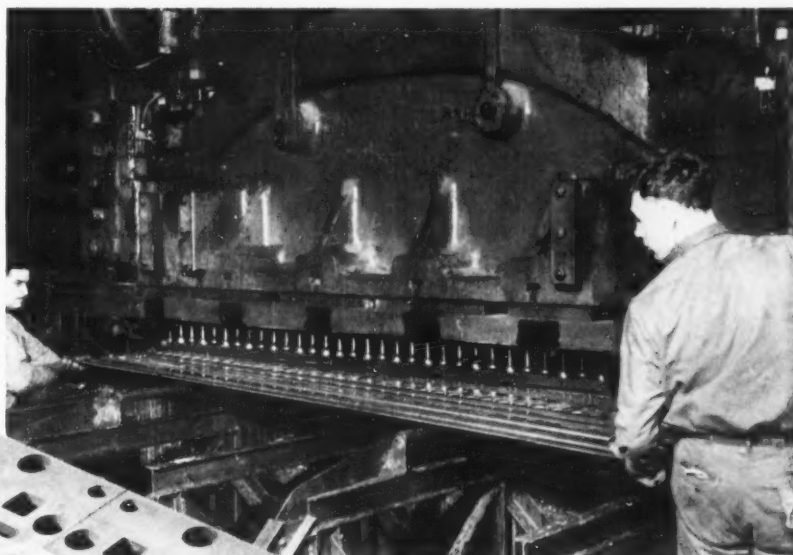
# Tool Steel Topics



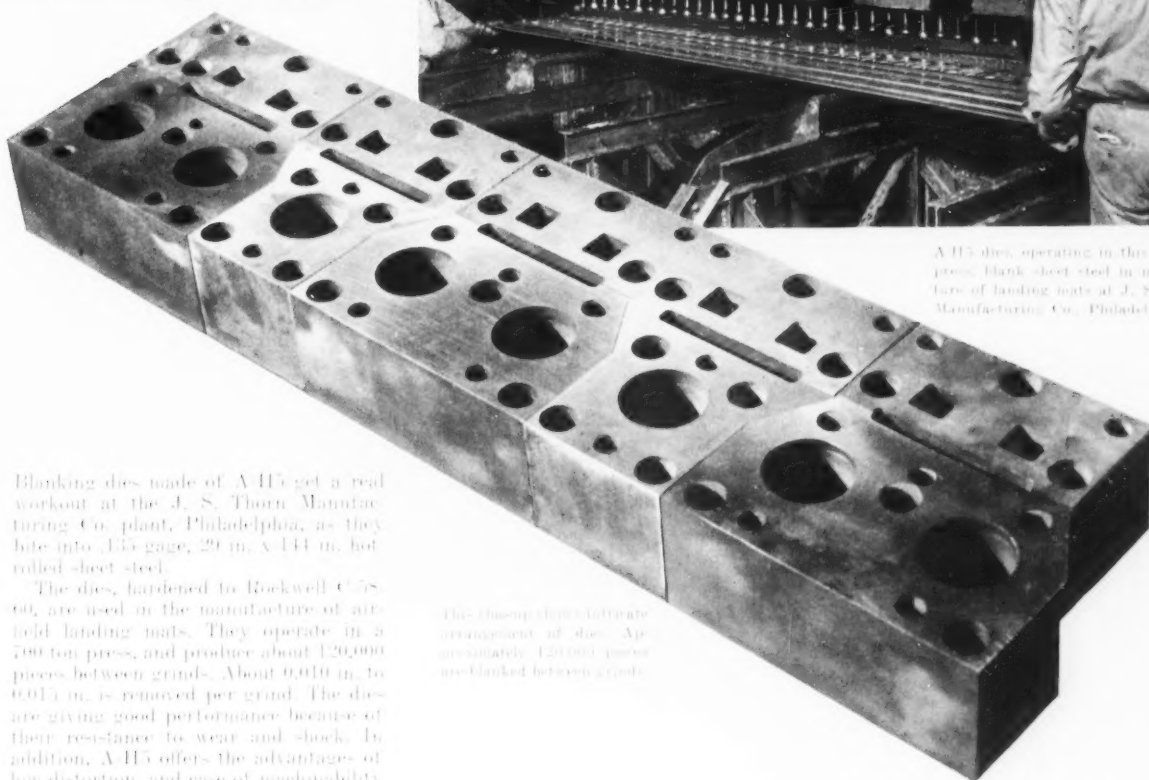
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

## Dies of A-H5 Give Good Service in Turning Out Landing Mats



A H5 die, operating in this 700-ton press, blank sheet steel in manufacture of landing mats at J. S. Thorn Manufacturing Co., Philadelphia.



Blanking dies made of A-H5 get a real workout at the J. S. Thorn Manufacturing Co. plant, Philadelphia, as they bite into 15-gage, 20 in. x 144 in. hot-rolled sheet steel.

The dies, hardened to Rockwell C-58-60, are used in the manufacture of air-field landing mats. They operate in a 700-ton press, and produce about 120,000 pieces between grinds. About 0.010 in. to 0.015 in. is removed per grind. The dies are giving good performance because of their resistance to wear and shock. In addition, A-H5 offers the advantages of low distortion, and ease of machinability and heat treatment.

A-H5 is our top chrome air-hardening tool steel. It's an easy tool steel to machine, too, as it can be annealed to 212 Brinell.

### Typical Analysis

Carbon 1.00 Molybdenum 1.10  
Manganese 0.60 Vanadium 0.25  
Chromium 5.25

A-H5 is an economical steel for dies, punches, and forming and blanking tools. It is well liked wherever safe hardening, low distortion and increased resistance to wear are required. Why not give it a trial? Your nearest Bethlehem tool steel distributor can supply you promptly.

This diagram shows intimate arrangement of dies. Approximately 120,000 pieces are blanked between grinds.



### BETHLEHEM TOOL STEEL ENGINEER SAYS:

*Avoid Premature Failure—Don't Make Shock Tools Too Hard*

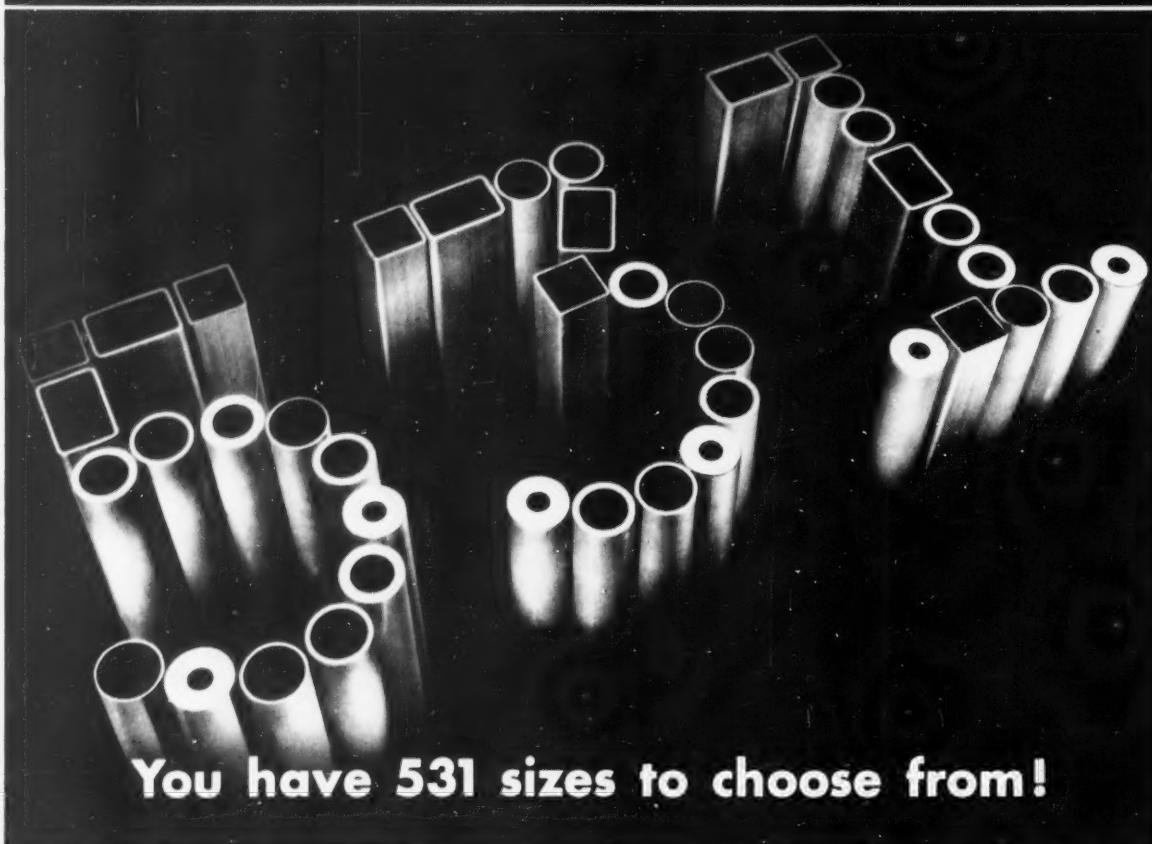
As a rule, shock-resisting tool steels perform best when they are hardened to Rockwell C-55-C-60. At such a range, there's a good compromise provided between toughness and resistance to wear. When premature failure occurs in these grades, it can usually be traced to excessively high hardness.

But rather than harden shock-resisting steels to Rockwell C-59 or higher, when such hardnesses are required, it would

be better to select a carbon tool steel.

When greater wear resistance is required, the chrome tungsten grades of shock-resisting tool steel may be carburized to provide a hard case and a shock-resisting core. The carburized case used for this type of shock-resisting steel should be only 0.010 deep. This method can be used to good advantage when you are manufacturing such items as reamers, sawing dies and master holes.

## WHY IT PAYS TO BUY MECHANICAL TUBING FROM US



**You have 531 sizes to choose from!**

WE carry no less than 531 sizes of Shelby Seamless Mechanical Tubing and can fill orders promptly — by the inch or by the carload. No matter what your tubing needs, we can supply you with the best for the job — tubing manufactured by the world's leading producer, National Tube Division of United States Steel.

Our experience in the field of tub-

ing applications has often saved large sums of customers' money — for it is sometimes possible to substitute a more economical type of tubing than you had planned to use.

We carry everything you need. Call us for: mechanical tubing, round and square, seamless and welded; boiler tubing, pressure tubing and pipe; stainless steel tubing, seamless and welded, and stainless pipe.

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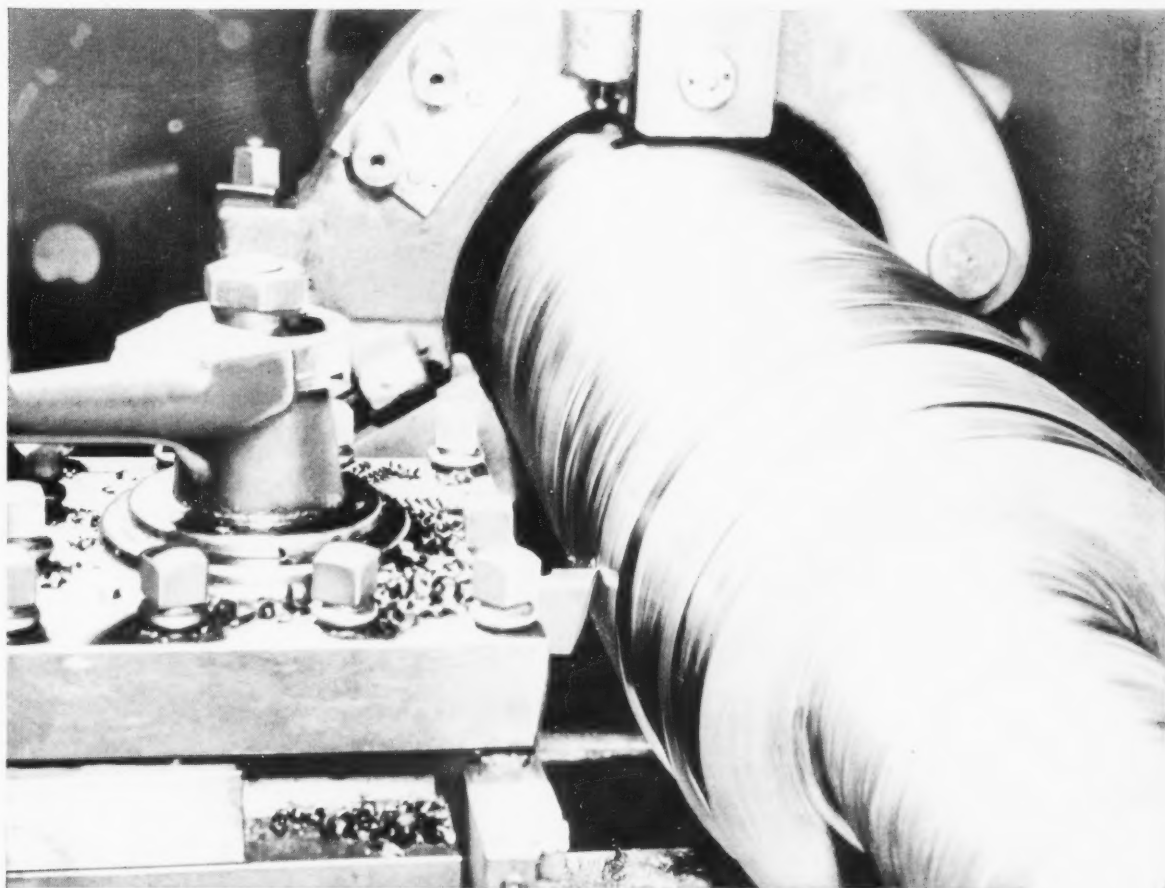
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Coast to Coast



UNITED STATES STEEL



Turning AISI 1045 modified (hot-rolled) steel, Grade 350 increased tool life, cut downtime, lowered unit costs.

## CARBOLOY ANNOUNCES NEW GRADE 350 CARBIDE FOR LIGHT ROUGHING, GENERAL FINISHING OF STEEL

**On-the-job tests show that Grade 350 cuts faster, lasts longer than existing carbides; boosts production up to 30%**

Carbide Grade 350—the second of the new Series 300 steel-cutting carbides—combines superior wear resistance and extreme toughness to an extent never before possible in the light roughing and general finishing range of steel machining. This has been proved on exhaustive on-the-job customer tests and applications (photos, operating data on following pages). Grade 350 is outperforming all existing carbides by up to 30% in this medium-duty range.

### **Built-in Tip Rigidity**

A new, carefully controlled manufacturing process gives Grade 350 a unique grain structure and built-in structural rigidity. This rigidity enables Grade 350 to effectively resist the high temperatures

(around 1300° F.) encountered during high-speed machining . . . conditions which cause the cutting edges of other carbides to deform.

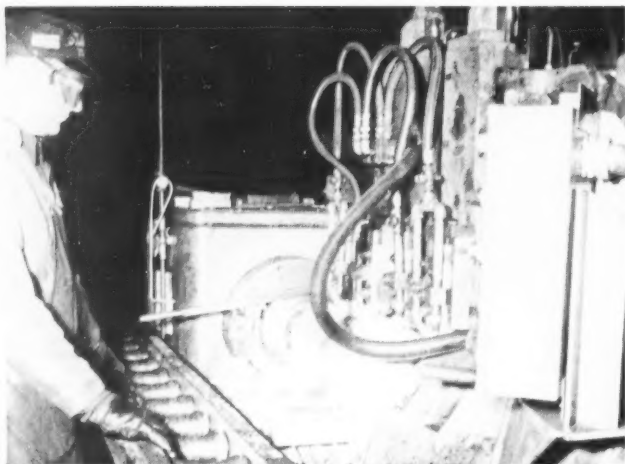
### **Two Steel-Cutting Grades Now Available**

Grade 370 for heavy-duty steel cutting, introduced late in 1953, was the first of the new Carbide Series 300 carbides. Now Grade 350 extends the machining range of this new series to medium-duty steel cutting. Both grades are available immediately in a wide range of Standard Carbide Tools and blanks.

Typical in-plant case histories of these two new grades, with photos and operating data, are included on the following pages.

# CARBOLOY GRADE 350 . . .

For light roughing and general finishing of steel

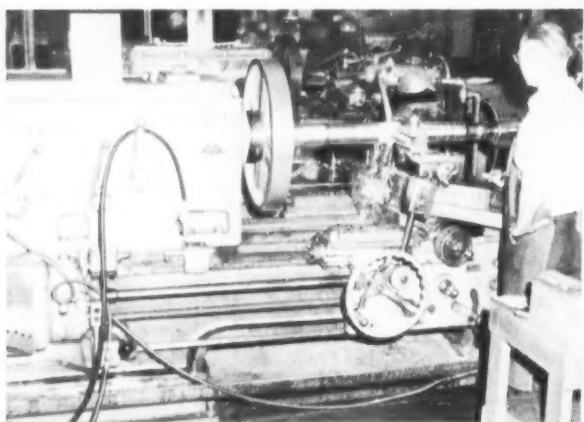
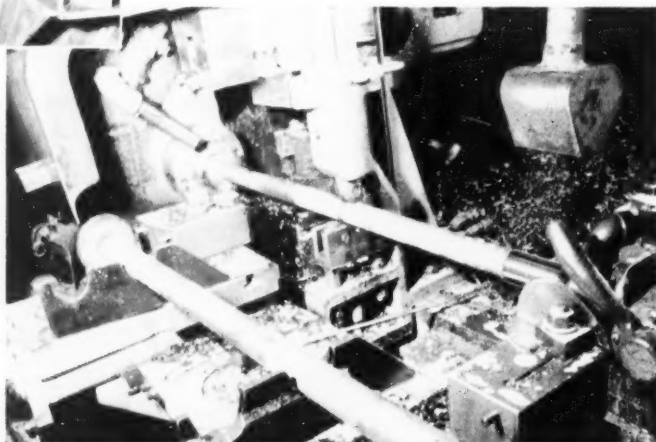


← **8-INCH STEEL SHELLS.** Grade 350 increased production runs on these forged and extruded shells between 15 and 20 pieces per grind. At toughest stage of rough turning operation, Grade 350 processed 4 times as many shells as other carbides.

**SETUP:** Material 1015 steel with varying heat analysis. **Speed** 302 SFPM. **Feed** .0011 inch. **Depth of cut**  $\frac{1}{16}$  to  $\frac{1}{8}$  inch. **Coolant** No.

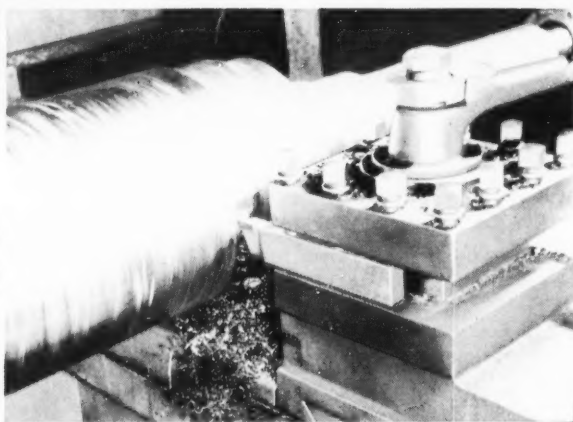
→ **TRUCK AXLE FORGING.** Turning with Grade 350 resulted in 33% more pieces per tool. Chipping and flaking, encountered with previously used tools, were eliminated.

**SETUP:** Material AISI 4150 steel forging. **Speed** 200 SFPM on 2 inch diameter; 100 SFPM on 4 inch diameter. **Feed** .0011 inch. **Depth of cut**  $\frac{1}{16}$  to  $\frac{1}{8}$  inch. **Coolant** Yes.



**LANDING GEAR PISTON.** Other carbides produced 2 parts per grind at 125 SFPM at Menasco Mfg. Co. Grade 350 increased speed to 135 SFPM. Production per grind went up 6 times; downtime was cut  $\frac{1}{2}$  hour per shift.

**SETUP:** Material 4140 heat treated forged steel. **Speed** 135 SFPM. **Feed** .0010 inch. **Depth of cut** .0060 to .0200 inch. **Coolant** Yes.



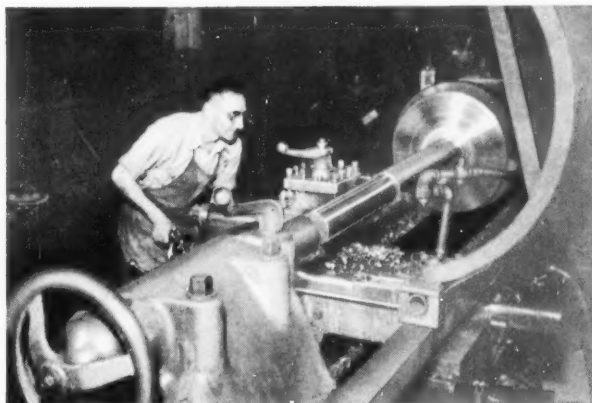
**ELECTRIC MOTOR SHAFT.** Carboloy Grade 350 increased the number of linear inches cut by 30% over other carbides used for roughing and finishing this large steel motor shaft.

**SETUP:** Material AISI 1015 modified (hot rolled). **Speed** 300 SFPM. **Feed** .0020 inch. **Depth of cut**  $\frac{1}{16}$  to  $\frac{1}{8}$  inch. **Coolant** Yes.



# CARBOLOY GRADE 370 . . .

For heavy-duty steel cutting at higher speeds



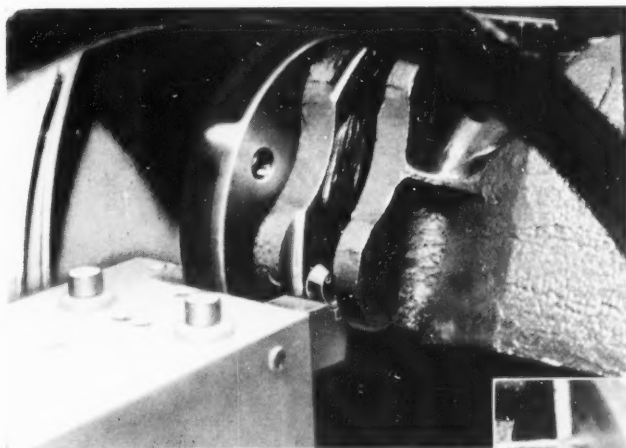
**JET ENGINE TURBINE WHEEL SHAFT.** A single Grade 370 tool now handles roughing and finishing at General Electric's Lynn River Works. Formerly, two tools were needed. Though operating at around 1700' F., Grade 370 increased tool life at least 10%.

**SETUP:** Material—1319 steel with Brinell hardness from 269 to 321. Speed—200 SFPM. Feed—0.013 inch. Depth of cut— $\frac{1}{8}$  to  $\frac{1}{4}$  inch.



**JET ENGINE TURBINE WHEEL RIMS.** With Grade 370, G.E. got 300% increase in life of tools used for turning, boring and facing cold-worked Tinklen steel rims. Downtime was reduced two thirds and tool breakage drastically cut.

**SETUP:** Material—Cold worked, forged Tinklen steel. Speed—160 SFPM on O.D.; 110 SFPM on I.D. Feed—0.010 inch. Depth of cut— $\frac{1}{2}$  to  $\frac{3}{4}$  inch. Coolant—Yes.

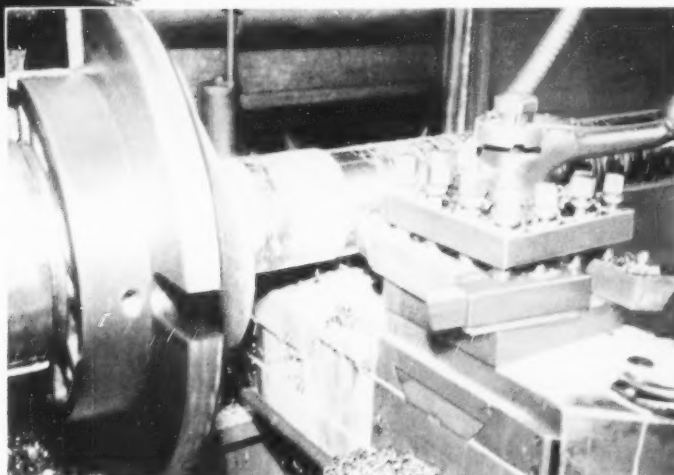


← **TRANSMISSION CASING** for fork lift truck. Machine downtime was sliced 50% and tool life extended almost 40% when Yale and Towne switched to Grade 370. Despite irregular steel casting, tool life on plunge facing operation increased 3 times with Grade 370.

**SETUP:** Material—Irregular cast steel with chilled spots and sand inclusions. Speed—313 SFPM. Feed—0.006 inch. Depth of cut— $\frac{1}{8}$  to  $\frac{1}{4}$  inch. Coolant—No.

**DRIVE ROLLER SHAFT.** Use of Carboloy Grade 370 on this heavily scaled forging reduced machining time 25% at Thew Shovel Co., Lorain, Ohio. Tool life was increased almost 50% and cratering encountered with other tools was eliminated.

**SETUP:** Material—AST 1015 hot-rolled forging. Speed—336 SFPM. Feed—0.025 inch. Depth of cut— $\frac{1}{2}$  inch.



# Grades 350 and 370 now available in a wide range of standard tools and blanks

Many Standard Carboloy Tools are now tipped with Grades 350 and 370. In addition, blanks and inserts of each grade are available in several styles and in many sizes.

Your Authorized Carboloy Distributor now has complete stocks of tools and blanks to fill most of

your requirements. Other styles and sizes are available nonstock.

For more information on medium-duty Grade 350 and heavy-duty Grade 370, and for price lists and specifications, send coupon, today.

For light roughing and general finishing of steel

## GRADE 350

### STOCK ITEMS

**Blanks**—6 styles, 40 sizes

**Tools**—5 styles, 20 sizes

Other styles and sizes available nonstock

For heavy-duty steel cutting

## GRADE 370

### STOCK ITEMS

**Blanks**—6 styles, 55 sizes

**Tools**—9 styles, 26 sizes

Other styles and sizes available nonstock

## CARBIDES FOR ALL YOUR MACHINING

In today's competitive economy, carbides can cut your unit production costs on machining all materials—ferrous or nonferrous, metallic or nonmetallic.

Standard Carboloy Tools and blanks in other grades suited for your job are available. Contact your local Carboloy Authorized Distributor or salesman for tooling assistance. Send coupon, today, for free, new Brief-A-Log (GF-230) containing complete specifications and new lower prices!

# CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

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### CARBOLOY

Department of General Electric Company,

11147 E. 8 Mile Ave., Detroit 32, Michigan

☐ Send Price List GF-300, containing specifications and prices on new Grades 350 and 370

☐ Send new Brief-A-Log GF-230, containing specifications and prices on Standard Carboloy Tools and blanks in other grades

Name \_\_\_\_\_ Position \_\_\_\_\_

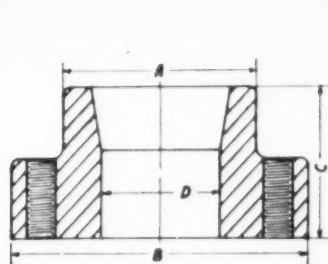
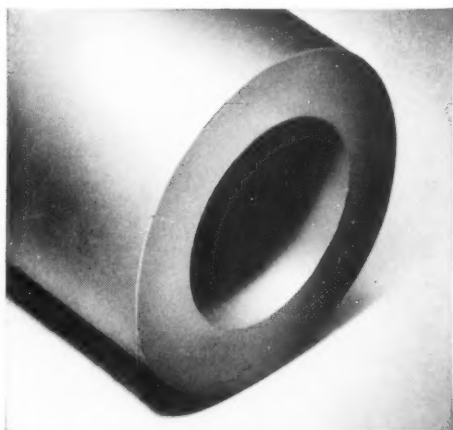
Company \_\_\_\_\_

Address \_\_\_\_\_

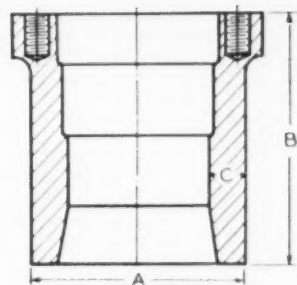
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



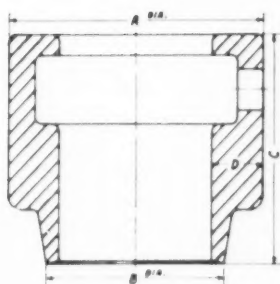
# Making ring-shaped tool steel parts?



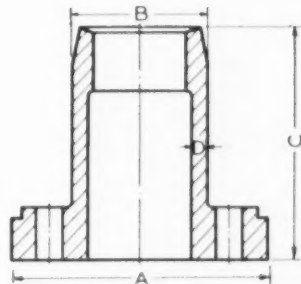
SIZING  
DIE



BLANKING AND  
FORMING DIE



UPSETTER  
DIE



FORMING AND  
PIERCING DIE

**New GRAPH-MO HOLLOW-BAR® eliminates drilling—and machines 30% faster**

**B**Y using Graph-Mo Hollow-Bar®, makers of ring-shaped tool steel parts can start with finish boring. There's no drilling—the hole's already there. Production is speeded up, scrap waste cut and steel saved.

You get all the proved advantages of Graph-Mo, too. Because of the free graphite in its structure, Graph-Mo machines 30% faster than other tool steels and has a minimum tendency to pick up, scuff or gall. And the combination of free graphite and diamond-hard carbides gives Graph-Mo Hollow-Bar exceptional durability. Users report that it outwears other tool steels on an average of 3 to 1.

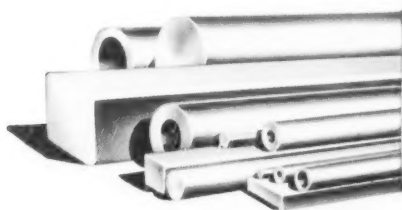
Stability tests prove Graph-Mo is the most stable tool

steel ever made. For example, after 12 years a typical Graph-Mo steel master plug gage showed less than 10 millionths of an inch dimensional change. It responds uniformly to heat treatment, too.

Make sure you're getting all the advantages of Graph-Mo Hollow-Bar if you make ring-shaped tool steel parts. Sizes range up to 16" O.D. with a variety of wall thicknesses. Graph-Mo Hollow-Bar is distributed through A. Milne and Co. and Peninsular Steel Co. warehouses.

For more information about Graph-Mo Hollow-Bar, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, O. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

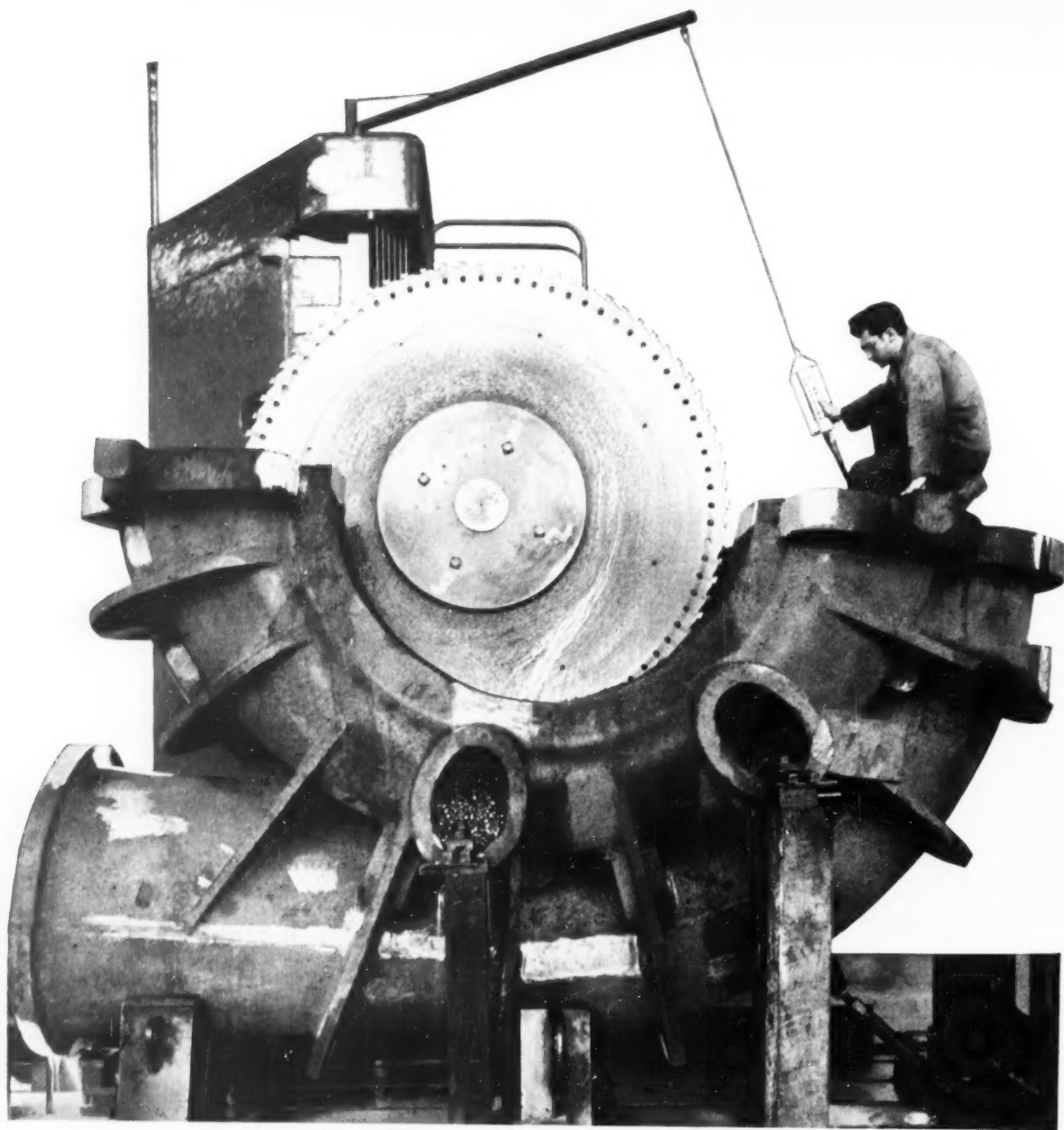


**TIMKEN**  
Fine Alloy  
**STEEL**

**SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING**

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—113



## Carving a 5-in. Slot in a 40-Ton Casting

This one-piece steel casting is the upper portion of a huge blower to be used in an aircraft testing wind tunnel. It is a big casting by anybody's standards, and one that was not simple to make.

The part weighed slightly under 40 tons as cast. Specifications called for a slot 5 in. wide through 17 in. of solid steel. That's what's going on in the picture—the slotting operation. Bethlehem made the incision with a 9-ft rotary saw, which would qualify as major machining anywhere.

If your own work requires non-steel, or bronze castings, be sure to investigate the many unusual services we offer. A Bethlehem made casting is subject to precise metallurgical

controls and careful attention to engineering details. It can be given any desired type of heat treating. And if machining is needed, our shops can handle the job beautifully.

Not all Bethlehem castings are as large as the one shown here. Naturally, we're interested in the smaller kinds of work, too. But large or small, a Bethlehem casting is a *good* casting—as good as you can buy. Why not send us your next inquiry?

BETHLEHEM STEEL COMPANY  
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation, Export  
Distributor: Bethlehem Steel Export Corporation





HOW MANY OPERATIONS  
WHEN YOU PREPARE  
STEEL FOR PAINTING?

	Operations
Cleaning	1
Rinsing	1
Pickling	1
Rinsing	1
Conditioning	1
Rinsing	1
Drying	1
Total	3

**What's wrong with that addition?** How can seven operations add up to three operations?

It's easy when you use Oakite Compound No. 33 (or Oakite Compound No. 31) to remove rust or heat scale *at the same time that it removes oil at the same time that it prepares steel (or aluminum) for the lasting adhesion of paint.*

That combines cleaning, pickling and paint conditioning into one operation. After rinsing and drying, you have saved the time, the tanks, the space and the solutions for four operations.

O. C. No. 33 is great for removing heavy soil in tanks or for cleaning by hand. O. C. No. 31 is very economical for removing moderate soil in tanks. Each compound is able to strip certain types of paint.

**FREE** For booklets describing the specific advantages and applications of Oakite Compounds Nos. 31 and 33, just mail the coupon.



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SPECIALIZED INDUSTRIAL CLEANING  
**OAKITE**  
MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC., 26 Rector St., New York 6, N. Y.

Send me your **FREE** booklets on Oakite Compounds Nos. 31 and 33. I am especially interested in removing the following soils from ☐ steel, ☐ cast iron, ☐ sheet aluminum, ☐ aluminum castings:

- |                                              |                                      |                                         |
|----------------------------------------------|--------------------------------------|-----------------------------------------|
| <input type="checkbox"/> Oil and grease      | <input type="checkbox"/> Carbon smut | <input type="checkbox"/> Tarnish        |
| <input type="checkbox"/> Drawing compounds   | <input type="checkbox"/> Paint       | <input type="checkbox"/> Welding flux   |
| <input type="checkbox"/> Rust preventives    | <input type="checkbox"/> Rust        | <input type="checkbox"/> Soldering flux |
| <input type="checkbox"/> Identification inks | <input type="checkbox"/> Heat scale  | <input type="checkbox"/>                |

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Company \_\_\_\_\_

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NO NEED to look up a supply source every time you buy Bronze Bearings and Bars. Your industrial distributor is permanently situated in your local area to serve you with Bunting Products and an infinite variety of countless other items.

YOUR BUNTING distributor is the leading industrial distributor, or a stock-carrying specialist in certain industrial items. With money-saving convenience, he can supply hundreds of different sizes of completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars.

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BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

Ask him  
for a Bunting  
Catalog which gives  
complete dimensional  
and technical data.



The Bunting Brass & Bronze Company • Toledo 1, Ohio • Branches in Principal Cities • Distributors Everywhere

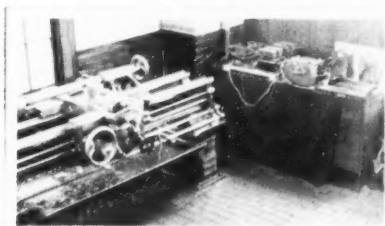
## Now ... Picture These Advantages for Your Tools and Dies !

**Make this 3-Minute Check ... Discover what has been put into a dependable die steel to help you get better die performance, lower costs!**

Improving existing die steels and developing new ones to meet the need for lower production costs, has been a challenge met by Carpenter. The results are modern die steels that heat treat and machine

easier to save time and money; run longer between grinds to reduce unit costs. Here are facts about *Stentor* (Oil-Hard) Die Steel—one of 12 modern steels in Carpenter's well-known Matched Set. Check what *Stentor* offers; ... compare it point by point with the die steel you now use. We believe you'll agree! Here is a real opportunity to put your tooling ahead of competition, take a big step to high quantity output at reduced unit costs.

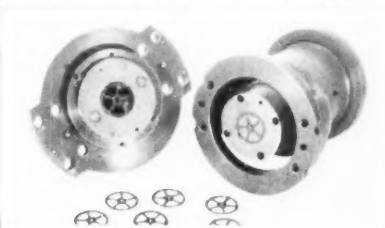
**Here is what *Stentor* gives you... COMPARE it with the die steel you use...**



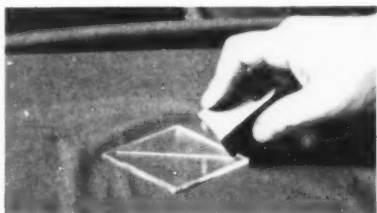
**Easy Machinability.** Two steels were put through this machining test. One, a well-known oil-hardening tool steel; the other, *Stentor* with its simplified analysis. Bars tested were  $3\frac{1}{2}$ " rd. with same Brinell hardness and structure. Result: With a cut .020" deep, *Stentor* proved to be 11% easier to machine than the other steel. Does the steel you use provide this *extra economy* in machining?



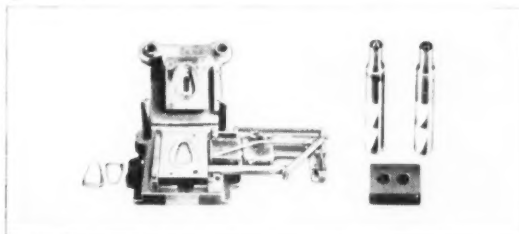
**Simplified Heat Treating.** Because of *Stentor's* simplified analysis, it hardens from the low temperature of 1420° to 1450° F. This low temperature reduces dangers of size change and decarburization—holds warpage to an absolute minimum. How does the steel you use compare with this?



**Safety and Accuracy in Hardening.** This punch and die blanks  $1.342$ " dia. timing mechanism gears having 120 teeth/90 pitch, made from 24 ga.  $\frac{3}{4}$ -hard brass. Customer reports: "In heat treatment the *Stentor* die moved only .0005" on the max. dia. of the gear!" If the oil-hardening steel you use doesn't behave like this, it's time to change to *Stentor*!



**Freedom from Decarburization.** Here is a *Stentor* part as quenched and before drawing, showing absence of soft skin. This test proves that *Stentor* tools when properly hardened are hard enough, right on the surface, to scratch glass! Does the steel you use give you this *positive freedom* from decarb?



**Full Dependability in Service.** Here are just two examples of the job *Stentor* does day after day in service. Die on left gave *8 1/2* continuous hours of production between grinds compared to *10 hours* with a chrome-tungsten grade! The  $\frac{1}{4}$ " dia. punches shown to right above punch  $\frac{1}{4}$ " thick SAE 1020 steel. After *Stentor* was used production went up 160%. How much *more* output could you add to your total with *dependability* like this?



If you are not getting *all* of these advantages from the steel you use, you're missing a big opportunity to cut costs, raise output!

change to **Carpenter**

**Matched Tool and Die Steels**

**...modern die steels engineered to meet today's requirements!**

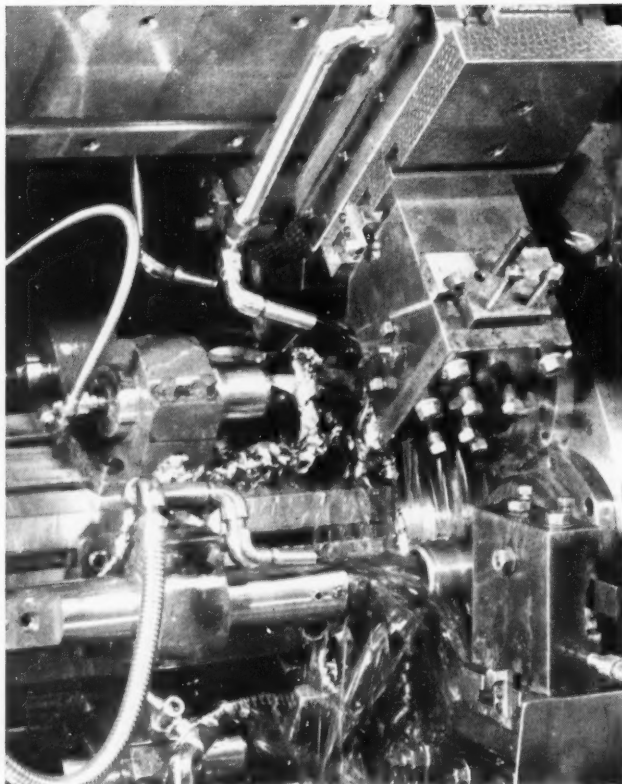
The Carpenter Steel Company, 105 W. Bern St., Reading, Pa.  
Export Department: The Carpenter Steel Co., Port Washington, N. Y. "CARSTEELCO"  
Get Immediate Delivery ... Call your Carpenter Mill-Branch Warehouse, Office or Distributor



# MACHINABILITY HERE...

*plus*

## REPUBLIC'S 3-D METALLURGICAL SERVICE



### HERE...

The field metallurgist comes right into your plant. He talks to your production and engineering people, asks questions, finds out what you want your cold drawn steels to do. He takes this data to...



### HERE...

A Republic Mill Metallurgist. He adds his knowledge to the report, checks it against your problem. Then, to make the report complete, a Republic Laboratory Metallurgist...



### AND HERE...

Adds his years of experience in testing cold drawn steels. All three men put their heads together and come up with the solution to your problem.



Free-Machining Bessemer, Alloy and Enduro Stainless Steels • Union  
Union Cold Drawn and Ground Rounds, Turned and Polished Rounds, Turned,





## MEANS LOWER UNIT COST HERE

And we have the facts to prove it.

The proof starts in our own plant, on our own automatics, where we pre-test the machinability of Republic Cold Drawn Steel.

More proof comes from our customers—from our field metallurgists and machining specialists working closely with our customers.

The result: (1) top ratings you need on feeds and speeds; (2) long tool life; (3) improved surface finish; (4) freedom from abrasive elements; (5) high product quality.

These factors add up to *lower unit costs*.

Now is the time to put the MACHINABILITY of Republic Union Cold Drawn Steels to work in your plant. Our metallurgists and machine tool specialists are ready to help you work out quick, economical solutions to your metallurgical and machining problems.

Contact your Union Drawn Distributor or your nearest Republic District Sales Office.

### REPUBLIC STEEL CORPORATION

Union Drawn Steel Division • Massillon, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

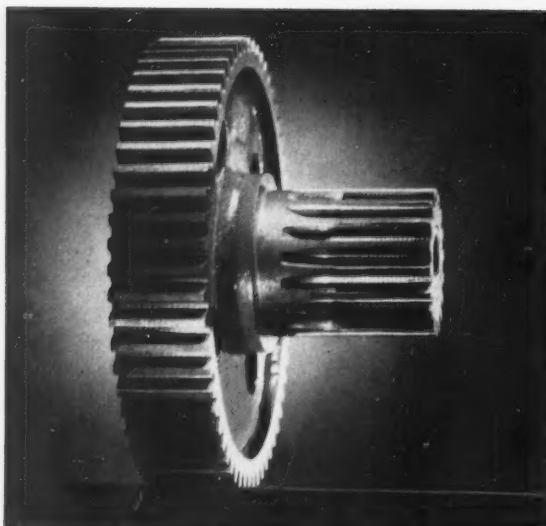
Export Department: Chrysler Building, New York 17, N. Y.

Cold Drawn Special Sections  
Ground and Polished Rounds

REPUBLIC *Union*



COLD DRAWN STEELS



Fit as a fiddle . . . aptly describes this Ductile Iron camshaft drive gear. It was installed in an automatic labeling machine on March 3, 1952, at Bestway Products, Inc., Rahway, N.J. Ductile Iron "as

cast" provides high strength, resistance to wear and galling, with good notched endurance properties. Inspection of the gear on June 15, 1953, found it to be as good as new and it's still on the job.

# 12 TIMES Longer Service with Gears of Ductile Iron

"You can't sell Christmas records in January."

That's the way Louis Quitoni, Plant Superintendent, of Bestway Products, Inc., put the problem when his labeling machine — geared for 1,000,000 records a month — kept breaking down.

Imagine the backlog that built up, and what happened to deliveries . . .

*Until this Ductile Iron gear was installed.*

*"The latest gear . . . machined from a Ductile Iron cast-*

The International Nickel Company, Inc.  
67 Wall Street, New York 5, N. Y.

Please send me a list of publications on  
DUCTILE IRON.

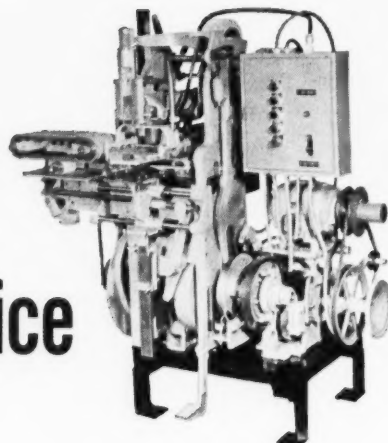
Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_



Harmony in motion . . . is essential in the musical record business, where downtime of equipment stops deliveries with dire results. Look at this "Pony Label-Dri" automatic

labeling machine, produced by New Jersey Machine Corporation, Hoboken, N. J. One of this type labels records for Bestway Products, often 'round the clock.

\* \* \*

ing," writes Bestway Products, "has given a truly remarkable performance."

The two principal requirements of this gear are 1) a high order of wear resistance and 2) ability to withstand sudden shock loads imposed by a knife clutch. This machine is intermittently operated and tripped 3 or 4 times a minute.

So far, Ductile Iron has given 12 times the service of high test iron gears which failed in about 2 months. So far, the initial Ductile Iron replacement has served 2 years, and it's still on the job.

New Jersey Machine Corporation, builder of this machine, as a result of this service life has standardized on Ductile Iron for camshaft drive gears for original and replacement installation.

In plants from coast to coast, Ductile Iron is saving money at every turn. How? By its remarkable load-carrying ability and wear resistance, combined with excellent castability, ready machinability and moderate cost.

Send us details of prospective uses. We'll gladly suggest a source of supply from some 100 authorized foundries now producing Ductile Iron under patent licenses. Request a list of available publications on Ductile Iron . . . mail the coupon now.

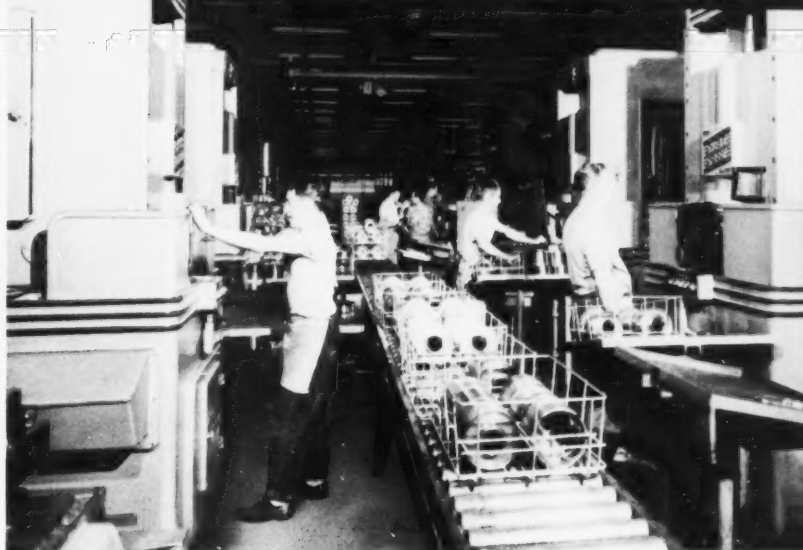


**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET  
NEW YORK 5, N. Y.



**ACCURACY**—Accuracy of the gear is directly related to the accuracy of the hob that generates the teeth of the gear. A Michigan Tool inspector is shown here checking and charting the accuracy of a large two-thread Michigan Process hob on the Michigan Sine-Line model 874 hob lead checker.

## *This Month's* **GEAR PIX**



**15 SHEAR-SPEEDS**—Four of a battery of fifteen Michigan Shear-Speed gear shapers which cut a variety of slots or serrations on malleable planetary elements in a large automotive automatic transmission plant. All slots or serrations are cut simultaneously, in some cases two parts at a time, by the Shear-Speed gear shapers.

**NEW 3-WAY GEAR SELECTOR** automatically segregates 100% of gear production into undersize, oversize and OK gears as fast as they are cut or finished. Made in both gravity and conveyor types. May be attached to any gear cutting or gear finishing machine. Can be integrated with the machine cycle to automatically shut off the machine whenever a certain percentage of undersize or oversize gears are produced.



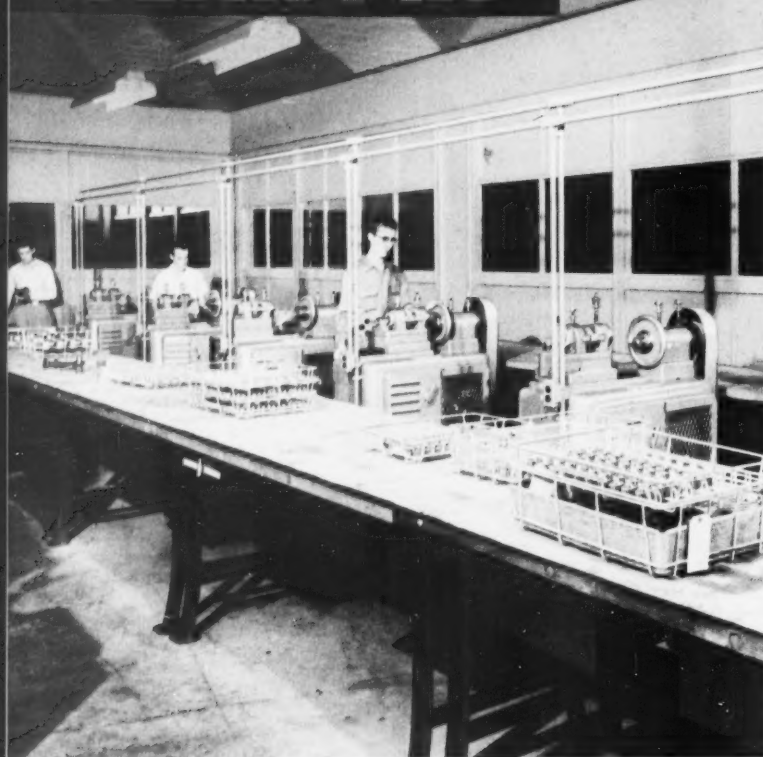
**MICHIGAN TOOL COMPANY**

7171 E. McNICHOLS RD. • DETROIT 12, MICH.

IN CANADA: COLONIAL TOOL CO. LTD.

*Over*

## *This Month's* **GEAR PIX**



**GEAR INSPECTION**—One of the rows of Michigan model 1129 gear speeders used to inspect gears in a large automotive automatic transmission plant, prior to assembly. Gears are speeded in mesh under brake loads to check quietness and tooth contact.

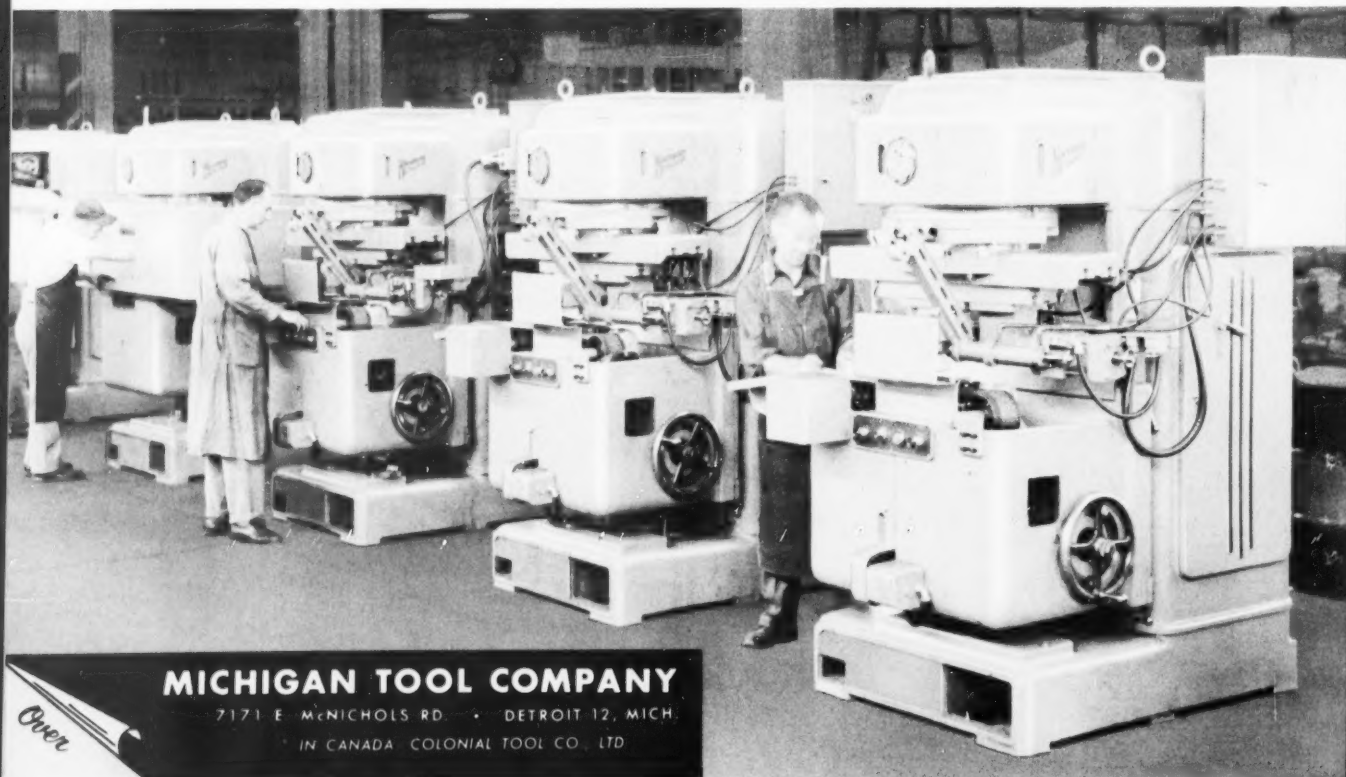


### **INVOLUTE AND TOOTH SPACING**

—One of the leading lathe manufacturers uses this Michigan Sine-Line model 1124 involute and tooth spacing checker to inspect the involute contours and tooth spacing on the helical and spur gears that are used in their line of lathes.

### **AUTOMATIC LOADING & SIZING**

More than four out of five of the standard Michigan 870 gear shavers now being built are equipped with automatic chute loading and automatic size checking. This speeds up the shaving cycle and permits one operator to handle up to three of these machines with ease.



**MICHIGAN TOOL COMPANY**

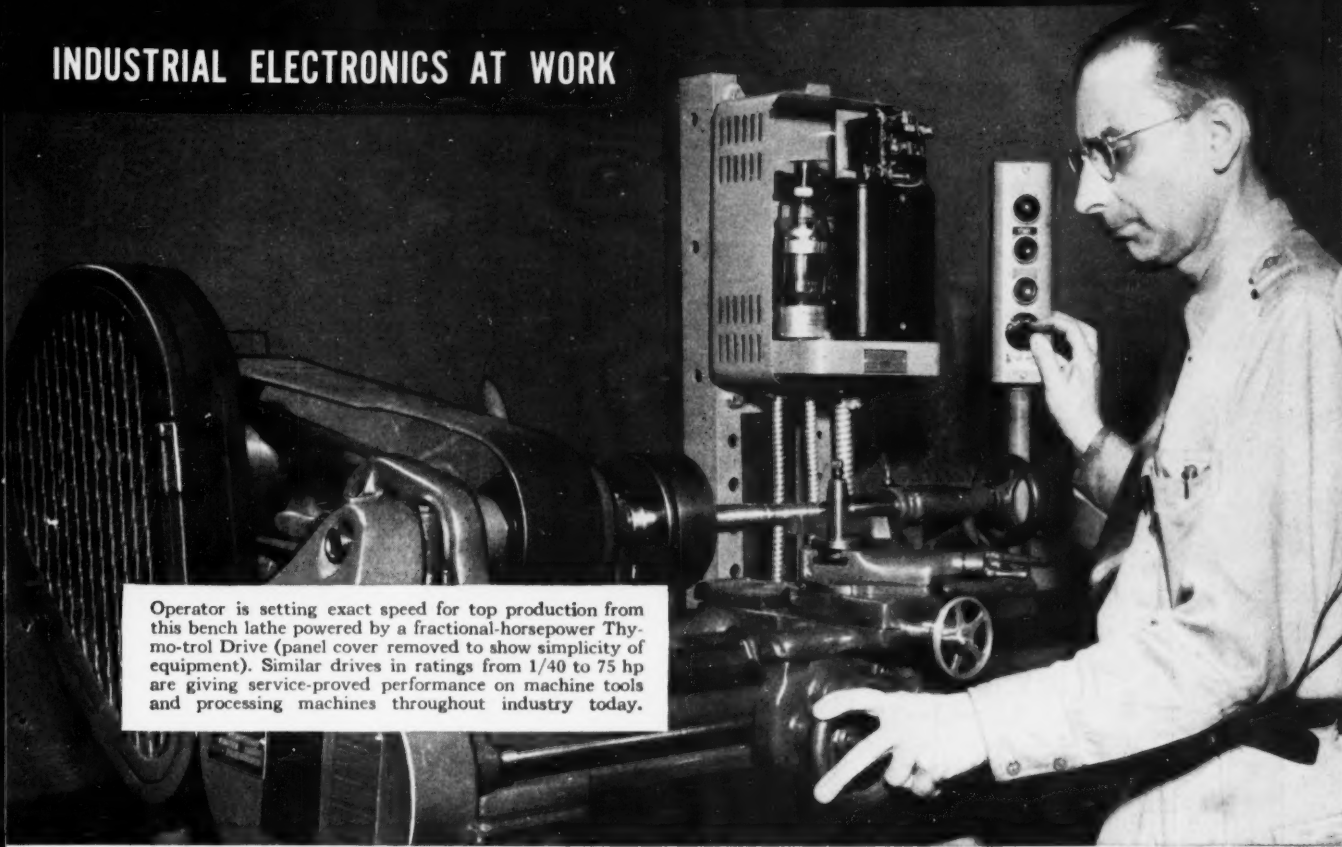
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IN CANADA: COLONIAL TOOL CO., LTD.

*Over*



## INDUSTRIAL ELECTRONICS AT WORK



Operator is setting exact speed for top production from this bench lathe powered by a fractional-horsepower Thy-mo-trol Drive (panel cover removed to show simplicity of equipment). Similar drives in ratings from 1/40 to 75 hp are giving service-proved performance on machine tools and processing machines throughout industry today.

When close speed regulation is required . . .

# General Electric THY-MO-TROL\* Drives Can Help You Cut Production Costs

**EXACTLY THE RIGHT SPEED FOR TOP PRODUCTION** is assured by the *wider speed ranges* offered by G-E Thy-mo-trol Drives . . . your machines are more versatile and more productive for a greater variety of jobs. Typical Thy-mo-trol Drive speed ranges are 5:1, 20:1, 50:1 and 100:1; and, if required, much higher speed ranges are possible under certain conditions.

**IMPROVED PRODUCT QUALITY AND LESS SPOILAGE** are made possible by the *infinite number of speed steps* and *closer speed regulation* provided by G-E Thy-mo-trol Drives. You get and hold the exact speed required for every job and maintain proper speed throughout your entire operating cycle.

**GREATER PROTECTION FOR DRIVE AND MACHINE** is yours with all full-wave G-E Thy-mo-trol Drives because current limiting features eliminate the danger of overloading machine or drive. If the driven machine should jam, the motor will automatically stall before torque becomes excessive.

\*Reg. Trademark of the General Electric Co.

**FOR COMPLETE INFORMATION** on these and the many other features of G-E Thy-mo-trol Drives contact your nearest G-E Apparatus Sales Office or send in the coupon shown below.

General Electric Company, Section G 790-1  
Schenectady 5, New York

- ☐ GEA5337, Thy-mo-trol Adjustable-speed Drives. Up to 30 hp.
- ☐ GEA5827, Precision Controlled Thy-mo-trol Drive.  $\frac{3}{4}$  to 10 hp.
- ☐ GEA5829, Simplified Thy-mo-trol Drive.  $\frac{3}{4}$  to 3 hp.
- ☐ GEA5179, Half-wave Thy-mo-trol Drive. Up to  $\frac{1}{2}$  hp.
- ☐ GEC-703, Full-wave Thy-mo-trol Drive.  $\frac{1}{4}$  to  $\frac{1}{2}$  hp.

Please send me the bulletins checked

- ☐ for reference only
- ☐ for planning an immediate project

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

GENERAL  ELECTRIC

MORE THAN 100 YEARS OF FILE MAKING AND STILL PIONEERING

EXCLUSIVE HELLER WAVY-TEETH

ORDINARY SINGLE CUT

## HELLER WAS FIRST WITH WAVY-TEETH MILL AND SAW FILES

You can remove more metal faster when you use Wavy-Teeth mill or saw files instead of ordinary single cut mill or saw files. Always specify "Wavy-Teeth" to get this exclusive Heller tooth arrangement . . . a typical development of Heller research. Through a continuous program of inspecting, testing and improving, Heller guarantees file users "the best."

other Heller *Firsts*

SPIRAL-CUT Half Round Files

NUCUT Wavy-Teeth Files

VIXEN Milled Curved Tooth Files

\*Registered T.M.

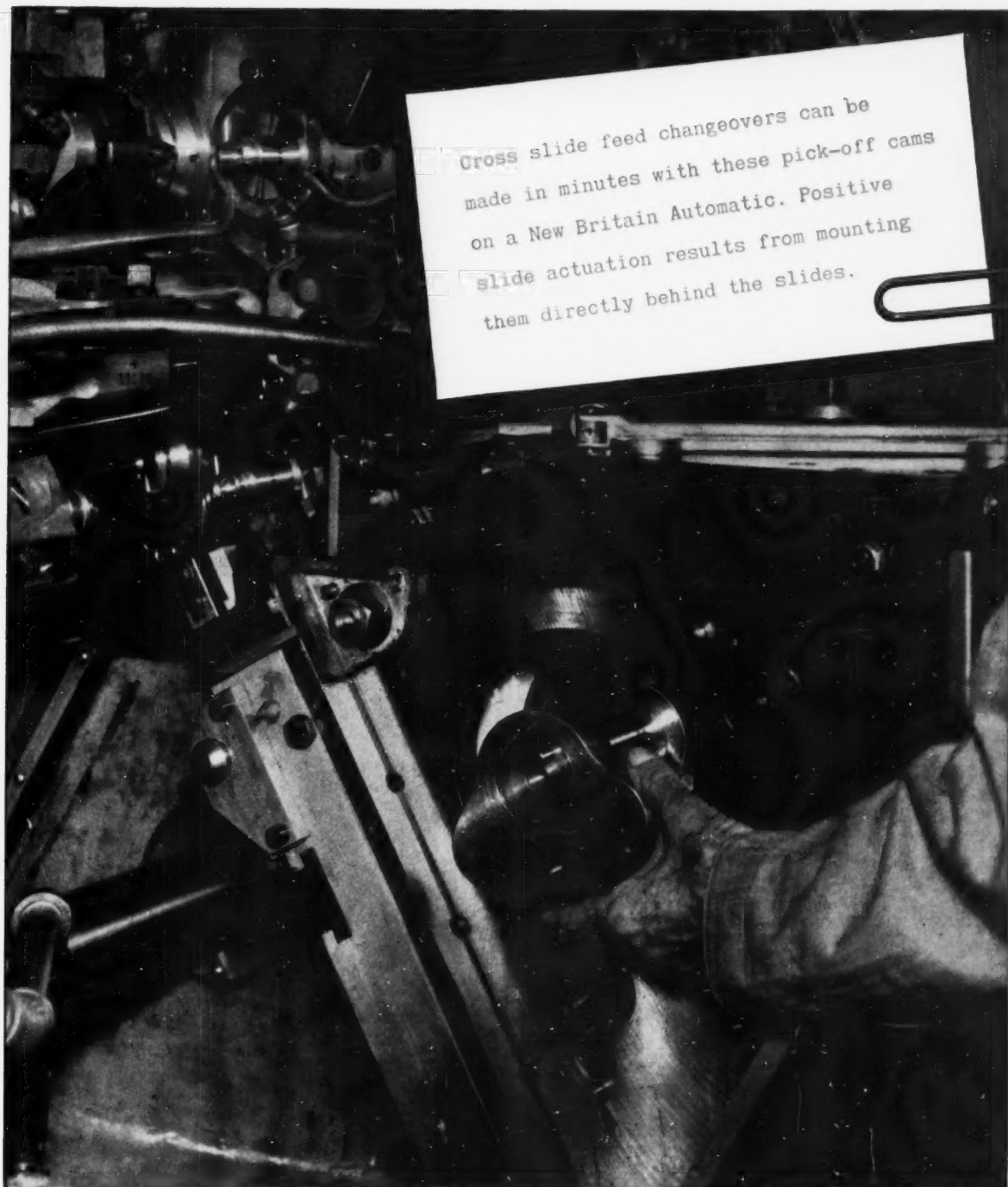


THESE 3 FAMOUS BRANDS ARE MADE ONLY BY

HELLER BROTHERS CO. America's Oldest File Manufacturer NEWCOMERTOWN, OHIO



YOUR HELLER DISTRIBUTOR CAN SUPPLY ALL YOUR FILE NEEDS



Cross slide feed changeovers can be made in minutes with these pick-off cams on a New Britain Automatic. Positive slide actuation results from mounting them directly behind the slides.

## THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut

**NEW BRITAIN**  
*Automatics*

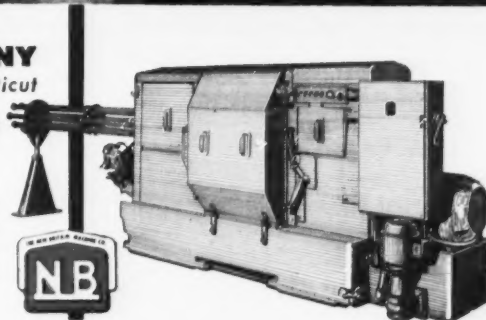
### Machines for Making Progress

Automatic Bar and Chucking Machines

Precision Boring Machines

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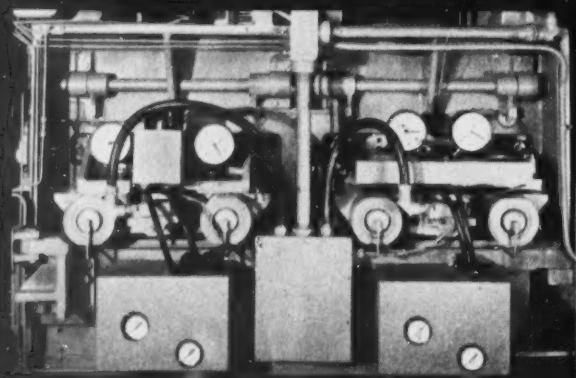


For more information on products advertised, use Inquiry Card, page 245

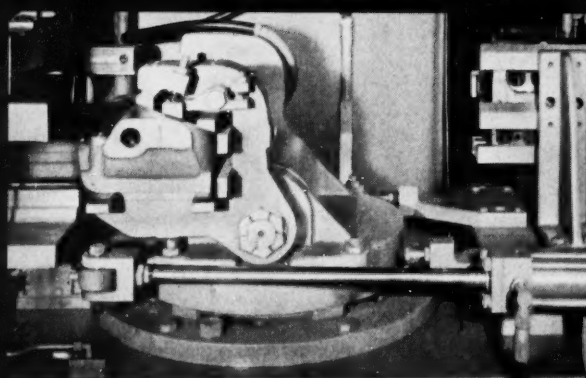
MACHINERY, June, 1954—125



# NEW NATCO HOLEWAY machines...



AIR INSPECTION Stations No. 9, 29 and 30 of the first machine check reamed holes for diameter and location.



90° ROTATE and TURN Station No. 32 of the first machine rotates part 90° around each of two axes simultaneously for proper positioning in second machine.

## ALL OPERATIONS COMPLETELY AUTOMATIC!

### MACHINE No. 1 (35 Station)

- |                |                       |
|----------------|-----------------------|
| 1 Loading      | 1 90° Rotating        |
| 14 Working     | 2 Interference Relief |
| 4 Checking     | 10 Idle               |
| 2 Chip Dumping | 1 Unloading           |

### MACHINE No. 2 (25 Station)

- |               |                          |
|---------------|--------------------------|
| 1 Loading     | 1 90° Rotating           |
| 13 Working    | 3 Idle                   |
| 3 Checking    | 1 Ejecting and Replacing |
| 1 Air Testing | 1 Unloading              |

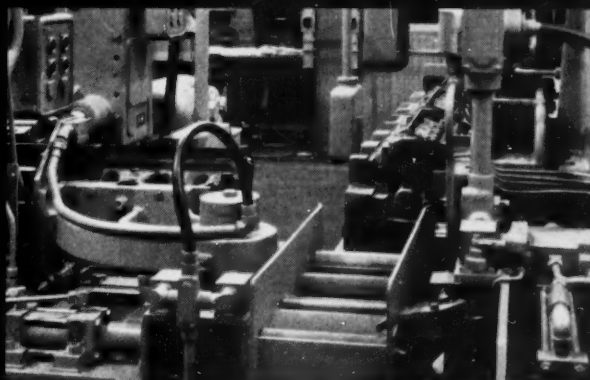
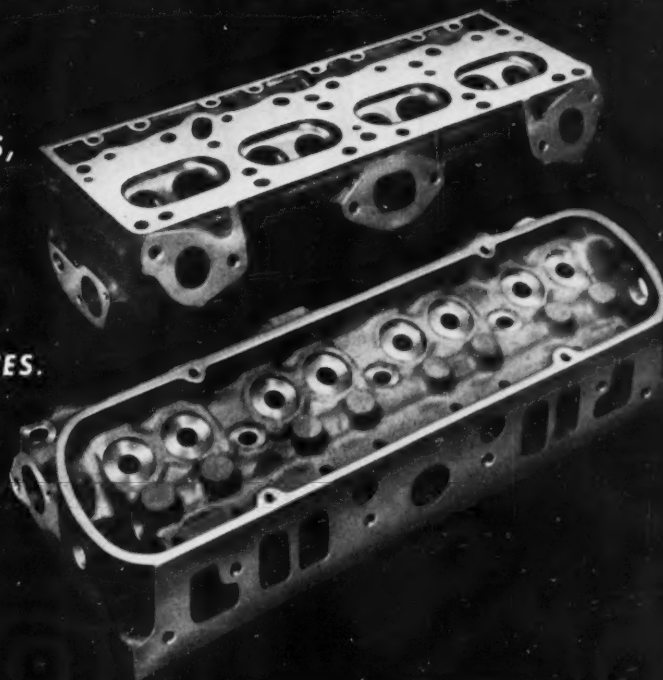
... ANOTHER MACHINE

**NATCO  
ENGINEERED**  
for quality and  
quantity production

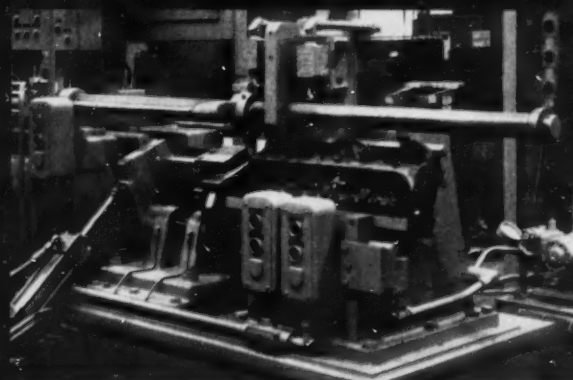


# 106 CYLINDER HEADS PER HOUR AT 85% EFFICIENCY!

DRILLS, REAMS, MILLS,  
CORE DRILLS, COUNTERBORES,  
SPOT FACES and CHAMFERS  
ALL SIX SIDES.  
REMOVES CHIPS,  
INSPECTS HOLE DEPTHS,  
SIZES and CENTER DISTANCES.  
CHECKS OIL GALLERY  
HOLE and EJECTS  
DEFECTIVE PART and  
REPLACES WITH  
SALVAGED PART.



REJECTION and REPLACEMENT Station 17 of second machine air checks oil gallery hole, automatically ejects defective part, station 18 automatically replaces with salvaged part.



70° ROTATION Station No. 24 of the second machine rotates part 70° to bring valve hole in horizontal plane.



*Call a Natco Field Engineer*

to help you solve your problems in  
Drilling, Boring, Facing and Tapping



**NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana**

*Branch Offices*

CHICAGO, 2009 Engineering Bldg. • DETROIT, 10138 W. McNichols Rd.  
BUFFALO, 1807 Elmwood Ave. • NEW YORK, 35 Beechwood Ave., Mount Vernon

# *45,000 laminations*

## **PER 8-HOUR SHIFT!**

**Westinghouse Electric Corporation**

**sets the pace with uninterrupted production  
and reduced "down-time" losses, on a**

# **DANLY PRESS**

Here is a perfect setup for steady, uninterrupted production of transformer core laminations at Westinghouse . . . a clear, fenced-off working area . . . automatic feed, slug disposal and piece part handling . . . and a Danly Autofeed Press!

Running almost continuously at a stroking rate of 120 per minute, this 150-ton Danly Press stamps out an average of 45,000 laminations during an 8-hour shift! Since installation no maintenance has been required . . . eliminating costly "down-time" losses, permitting full production and high operating efficiency. Greater rigidity and precision of the Danly Press has given the expensive die a longer lease on life, too . . . producing an estimated 750,000 pieces between grindings!

This Danly Autofeed Press is setting new production records at Westinghouse . . . and at leading stamping plants throughout the country. If you're looking for top production, check with Danly now. Write for free Danly Autofeed Press Booklet and get the details.

**DANLY MACHINE SPECIALTIES, INC.**

2100 South Laramie Avenue, Chicago 90, Illinois

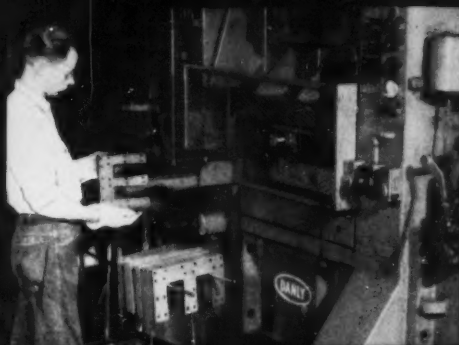


**Send for this  
FREE Catalog**

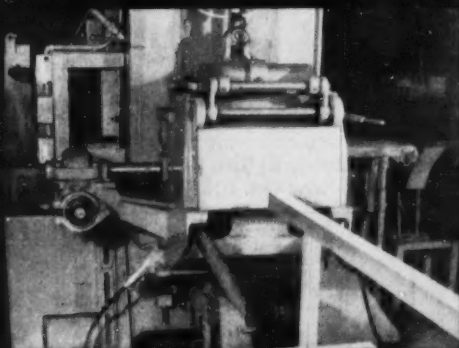


**MECHANICAL PRESSES . . . 50 to 3000 TONS  
SINGLE, DOUBLE, TRIPLE, ACTION  
AUTOFEED . . . UNDERDRIVE**

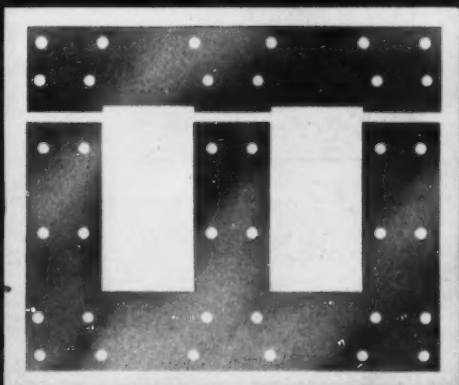




**Dynamic CBC** . . . (Counterbalancing Capacity)  
Engineered balancing of all moving parts under load, plus special design of press and counterbalance capacity to meet specific job needs, virtually eliminates "break-through" shock and "chucking"... makes press operation smoother, increases life of both press and dies.



**Faster Material Handling** . . . Feeding and scrap removal problems that go with high speed production are easily solved thanks to Danly's specially braced open bed construction. Slugs and scrap drop through the press bed and are continuously conveyed away as shown.



**Longer Die Life** . . . Costly carbide progressive dies are used to pierce, notch and cut off these .010" thick silicon steel laminations. In the Danly Autofeed, the dies average 750,000 pieces before regrinding is necessary.

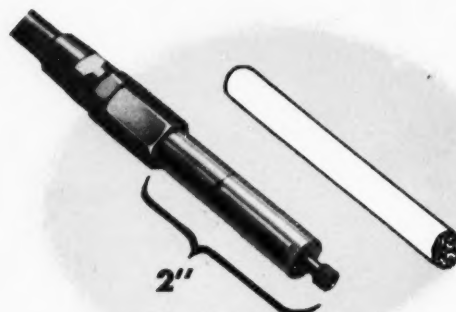
### It costs less to run a DANLY PRESS!

If your manufacturing process involves high production and expensive dies, it will probably be worth your while to talk with a Danly Press Engineer. Call now—he will be glad to discuss your specific problems. There is no obligation for this service.





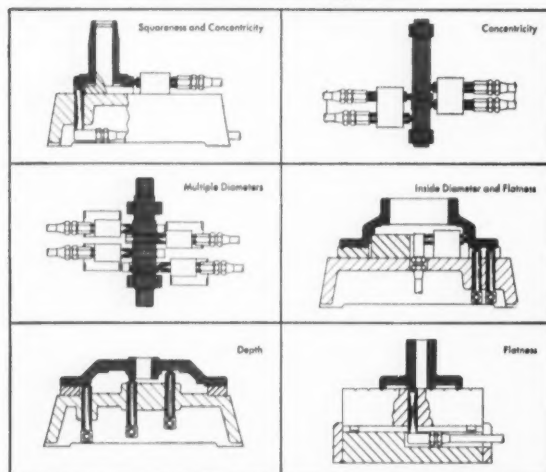
# FEDERAL



AIRPROBE is smaller than a regular cigarette!

**You Don't Need Any Masters to Calibrate the AIRPROBE**

**Some Jobs require Federal Special-Design Gages. Here's how the AIRPROBE is applied:**



Federal's Model 165 Hole Gage equipped with a Federal AirProbe. Gage makes mechanical contact with the hole diameter.

## 4 EXCEPTIONAL FEATURES:

### ① self-zeroing

No tolerance setting masters required — simply set the AirProbe to zero on the Dimensionair scale and adjust in the gage as you would a Dial Indicator.

### ② accurately calibrated

All readings on the dial are actual calibrated readings — not arbitrary values divided between minimum and maximum limits as with other air gages.

### ③ longer measuring range

A much longer range per magnification than that of other similar gage heads. Available ranges, with different dials, are .003", .006", .015", and .030".

### ④ longer approach range and overtravel.

With an approach travel of .031", a spindle travel of .140", and an overtravel of from .070" to .100", there's plenty of surplus for easy setting and measuring.



# AIR PROBE !

**Apply it directly to Federal Catalog Gages**

**— No need to design Special Gages!!**

The Federal AIRPROBE now makes it possible to gage by air a great variety of dimensions of almost any type, under almost any condition, when circumstances indicate that air can do the job best. It's a universal gage-head—a small, spindle-like device—which can be used in practically the same manner as a Dial Indicator on gaging fixtures, otherwise inaccessible locations, and on machine dimension control applications. Dimensional variations are read directly on the precisely calibrated dial of the Federal Dimensionair just as they are on a Dial Indicator.

Any production supervisor, engineer, or inspec-

tor, realizes that top efficiency lies in careful selection of the gage best suited to the requirements. Gaging with the DIMENSIONAIR AIRPROBE often offers certain advantages and enables him to meet his requirements with a greater degree of precision.

Federal offers practically all systems of gaging — air, dial indicators, electrical, and electronic. We design and make all these gages and can advise you *without bias* as to what system is best suited to your requirements. Ask our engineers for their recommendations. Federal Products Corporation, 4116 Eddy Street, Providence 1, R. I.

*Ask* **FEDERAL**  
**FOR ANYTHING IN MODERN GAGES...**

DIAL INDICATING, AIR, ELECTRIC OR ELECTRONIC — FOR INSPECTING, MEASURING, SORTING OR MACHINE SIZE CONTROL.



A regular Federal Catalog Gage, Model 36 B-6 Bench Hole Gage, equipped with a Federal AirProbe and Dimensionair. Don't waste time designing special gages to use air when Federal already has *Catalog Gages* of proved designs.



The well known Federal NB-60 is shown here with a Federal AirProbe and Dimensionair. Another illustration of the economy of using Federal "already designed and built" gages with air.

# MEET THE CHAMP!

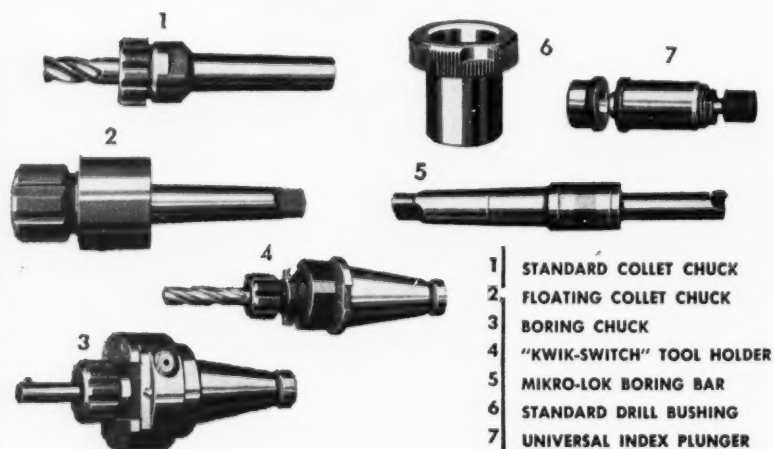
## UNIVERSAL DRILL BUSHINGS BEAT ALL RECORDS FOR LONG LIFE AND ACCURACY

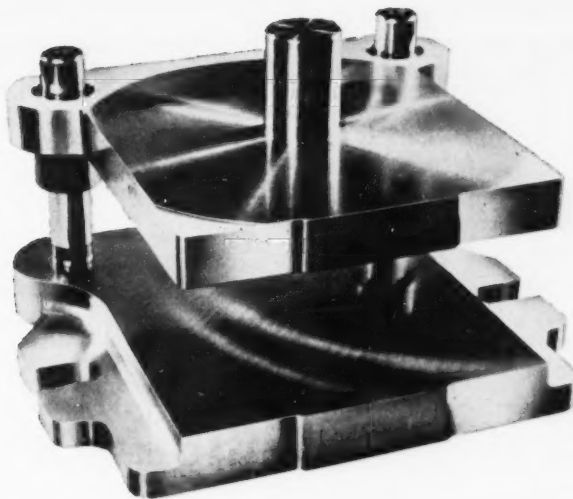


The extremely long life of Universal Drill Bushings is due to several factors. They are machined from finest quality steel. Their superfinish bores help to reduce both wear of the bushing and wear of the tools. Blended radius on the top inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests insure accuracy and uniform quality. Knurled heads provide a quick, sure grip. Available in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.

179

**UNIVERSAL  
ENGINEERING  
COMPANY**  
FRANKENMUTH 2  
MICHIGAN





## ***DANLY'S IN THE PICTURE***

*at Eastman Kodak Company*

Danly Die Sets play an important role in the manufacture of Eastman's popular new Brownie movie camera and Brownie movie projectors . . . latest in the Eastman line that Danly Die Sets have helped build all through the years. Used to mount high precision dies, Danly Die Sets help bring "master die" accuracy to every finished part. But Danly Die Sets do more . . . even before a press run ever starts. They make tooling-up easier, faster—save you many, many hours in the die shop. And once in production, these same Danly Die Sets do their share to maintain non-stop production . . . save down-time . . . increase die life. And remember, Danly Die Set service is as quick and convenient as a phone call.

**DANLY MACHINE SPECIALTIES, INC.**  
2100 South Laramie Avenue, Chicago 50, Illinois



### **PICK THE DANLY BRANCH NEAREST YOU!**

*CHICAGO 50	2100 S. Laramie Avenue
*CLEVELAND 14	1550 East 33rd Street
*DAYTON 7	3196 Delphos Avenue
*DETROIT 16	1549 Temple Avenue
*GRAND RAPIDS	113 Michigan Street, N.W.
INDIANAPOLIS 4	5 West 10th Street
*LONG ISLAND CITY	47-28 37th Street
*LOS ANGELES 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
*PHILADELPHIA 40	511 W. Courtland Street
*ROCHESTER 6	33 Rutter Street

\*Indicates complete stock.



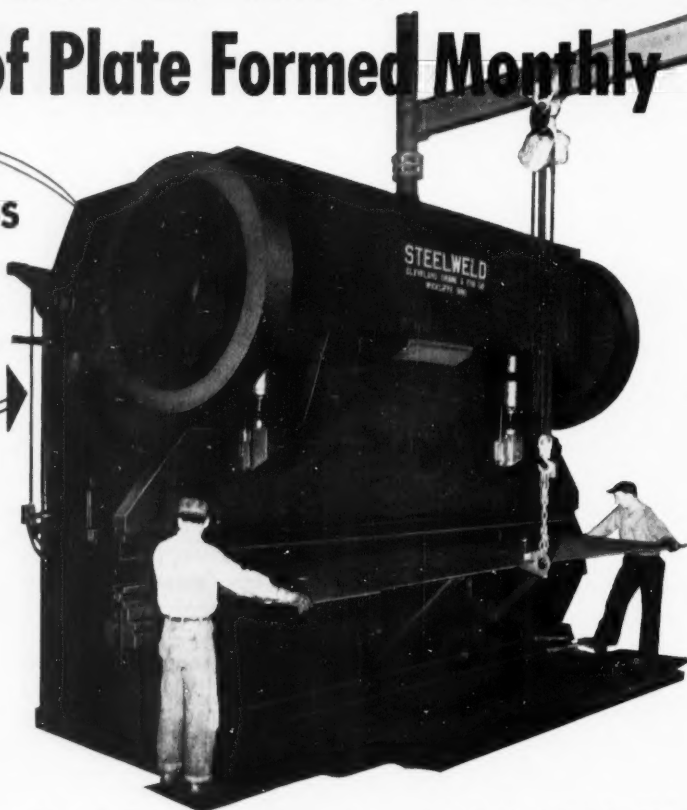
Some of the thousands of varied parts formed on the Steelweld Press. These involve bends and curves of every description in many

plate thicknesses. Bars of heavy cross-section, usually requiring a bulldozer, are formed into semi-circles for gear rims and similar uses.

## 800 Tons of Plate Formed Monthly

**STEELWELD PRESS**  
*Produces*  
**Infinite Variety of  
Curves and Bends**

This Steelweld Press is rated at  $\frac{1}{2}$ "x14'-0" mild steel. With the 24-inch bed and ram extension at each end, it will bend plate that can clear by the 18-inch deep throat to 18'-6" long. Two cross shafts with foot pedals are provided for operating the press. The lower shaft is for normal operation while the upper shaft brings the reversing flywheel into action to back the ram off the work whenever desired.



**E**VERY month some 800 tons of plate of all thicknesses to one-half inch is formed with bends and curves of every description on a Steelweld Press. The machine is in operation nine hours a day.

Since parts formed are produced in very small duplicate quantities, the dies and machine settings usually must be changed many times during a day.

Because of the ease with which Steelweld Presses can be set up, the operators can do this quickly and easily.

Steelweld Presses offer so many advantages that we urge you to write for the catalog below and get all the facts on them. Hundreds of these machines are now in use for bending, forming and punching operations of every description.



### GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

### THE CLEVELAND CRANE & ENGINEERING CO.

5451 EAST 281 STREET, WICKLIFFE, OHIO

## STEELWELD BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

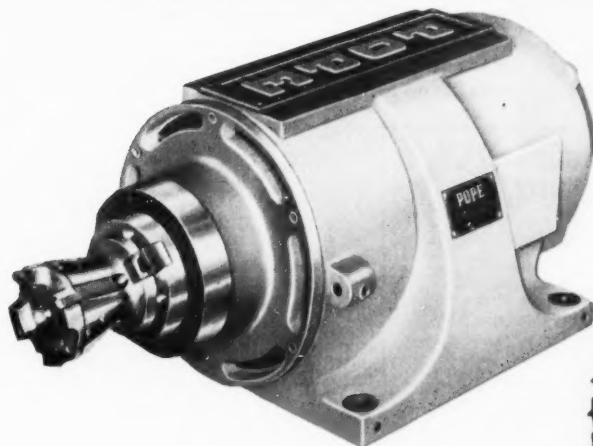




You Can *Specify*  
**POPE HEAVY DUTY**  
**WHEEL HEAD SPINDLES**  
 With Confidence

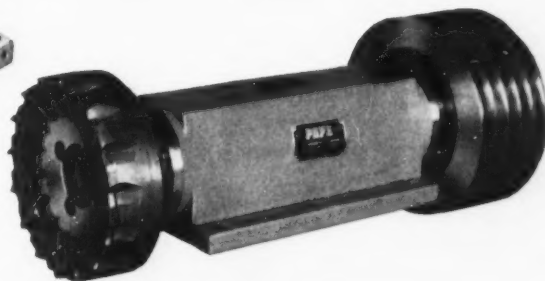
POPE Spindles like these are designed for a wide variety of applications including grinding, boring, milling, drilling and many other operations requiring **PRECISION COMBINED WITH RUGGEDNESS.**

For continuous production and trouble-free operation  
**THERE'S NOTHING LIKE A POPE SPINDLE WITH ROLLER BEARINGS**



**P-12007 Heavy Duty Belt Driven Milling ▶  
 Spindle, in sizes from 1 to 50 HP.**

◀ **P-2565 Heavy Duty, Totally Enclosed, Fan Cooled, Motorized Milling Spindle in sizes from 1 to 30 HP, 600 to 3600 RPM, 220-440 or 550 volts, 3 phase, 60 cycle (other electrical specifications available.)**



**SEND US YOUR SPECIFICATIONS AND LET OUR ENGINEERS RECOMMEND  
 THE SPINDLE FOR THE JOB YOU ARE GOING TO DO**

**No. 99**

*Specify*

**POPE**

**PRECISION SPINDLES**

**POPE MACHINERY CORPORATION**

*Established 1920*

**261 RIVER STREET • HAVERHILL, MASSACHUSETTS**

# MCCROSKY

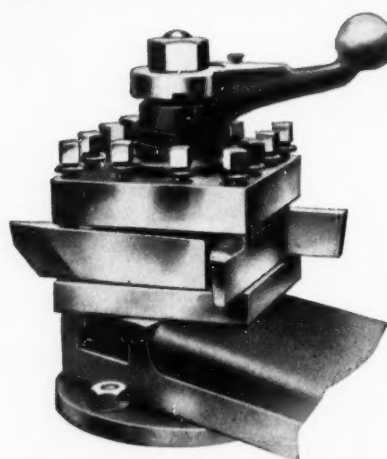
1904-1954

**COST  
CUTTING  
TOOLS**

50<sup>TH</sup> ANNIVERSARY

## *Turret* **TOOL POSTS**

**give engine lathes the  
advantages of turret lathes**



● The successive tools needed for multiple operation jobs can be swung into cutting position quickly — indexed accurately in any of 12 indexing positions — and locked rigidly when you use a McCrosky Turret Tool Post. Thus multiple tool jobs become continuous, enabling engine lathes to handle — efficiently and economically — a wide variety of work that otherwise would require a turret lathe or other specialized machine.

McCrosky Tool Posts are ruggedly built and provide the rigidity necessary for making heavy cuts. They feature many service-proved advantages,

available only in McCrosky design, that assure long, efficient, satisfactory operation. 5 different styles, including square and hexagon designs — 9 sizes — for mounting in the T-slot of the compound rest, or the bolt circle of the main slide. Used by leading concerns from coast to coast. **Endorsed by all well known lathe manufacturers.** Send for Bul. 17-T. It gives full details.

### **MCCROSKY**

*Universal*

#### **MILLING CUTTERS**

Body can be bladed to rotate either right or left hand. Consequently, selecting blades with tips of proper material mounted at proper angles produces a cutter that meets any metal or machine condition. Write for Bulletin No. 531 today.



### **MCCROSKY**

*Super Adjustable*  
**REAMERS**

Complete line includes chucking reamers with straight or tapered shanks, shell reamers with tapered holes for standard arbors or large straight holes for line bar reaming. Stock sizes from 15/16" to 6" diameter. High speed, cast alloy or carbide tipped blades. Write for Bulletin 18-R.



### **MCCROSKY**

*Jack-Lock*

#### **MILLING CUTTERS**

Face Mills, Shank and Shell End Mills, Half Side and Staggered Tooth Milling Cutters fitted with high speed steel, cast alloy or carbide tipped blades. Sizes from 3" to 24" in diameter to meet any requirement. Write for Bulletin No. 17-M.



### **MCCROSKY**

*Block Type*

#### **BORING BARS**

Individually ground and hardened tapered V-key center the block and cutting blades accurately and rigidly yet permits easy release for regrinding, and "floating" with extreme accuracy when making finishing cuts. Wide range of stock sizes. Write for Bul. 17-B.



### **MCCROSKY**

*Wizard*

#### **QUICK-CHANGE CHUCKS**

McCrosky's Wizard Quick-Change Chuck and Collet outfits hold tools centered and rigid. They enable the operator to change tools easily and quickly, without stopping or slowing down the spindle. Successive operation jobs become continuous. Write for Bulletin 18-C.



### **MCCROSKY**

*Multiple Operation*

#### **TOOLS**

McCrosky "Specials" combine two or more related boring, facing, chamfering or reaming operations into a single tool saving set-up time and cutting costs. Engineered by McCrosky to your work prints. Write for Bulletin 17-S



**COST  
CUTTING  
TOOLS**

# MCCROSKY

**TOOL  
CORPORATION**  
MEADVILLE, PA.

**Engineering and Sales Representatives in the Principal Cities**

**repetitive accuracy  
high speed production  
and fine finishes**

**...with push button**

**control!**

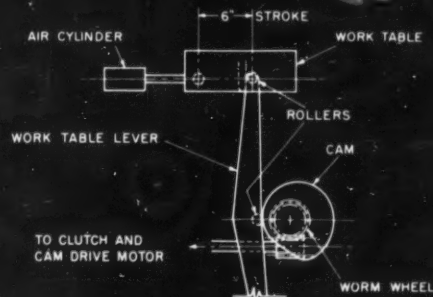
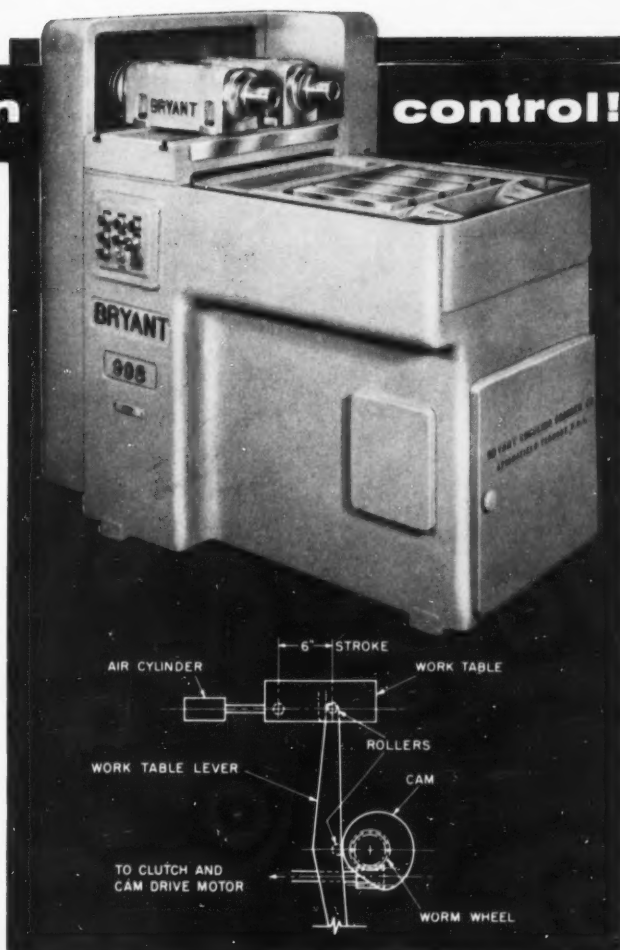
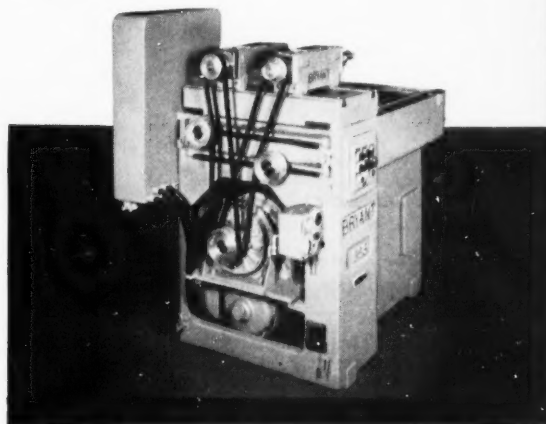
**BRYANT 6" STROKE**  
*all Mechanical*  
**BORING MACHINE**

This new Bryant 998 Boring Machine gives you fine finish and rapid production in precision boring, drilling, turning, facing, grooving, and contour turning and boring.

The cycle can be fully automatic and controlled with a single push button, or the operator can control any phase of the cycle manually.

To assure highest repetitive accuracy, the constant feed table on this boring machine is mechanically actuated by a cam and lever.

The wide bridge can accommodate as many as four boring heads of the smallest (209) bearing size. The 5 HP boring head motor provides ample power for driving the heads. Both the cam drive and the boring head motors are mounted in a well ventilated cavity in the bed.



**SPECIFICATIONS**

Total table stroke . . . . .	6"
Top of table to top of bridge . . . . .	4"
Width of bridge . . . . .	27 $\frac{3}{8}$ "
Multiple boring heads as required by tooling to a maximum of 4 (209) heads	
Table dimensions . . . . .	17 $\frac{1}{2}$ " x 22"
Floor space (without coolant tank) . . . . .	31" x 54"

*Mail coupon for complete details!*

**BRYANT** *Chucking Grinder Co.*  
SPRINGFIELD, VERMONT, U. S. A.

Internal Grinders • Boring Machines  
Internal & External Thread Gages • Granite Surface Plates

BRYANT CHUCKING GRINDER CO.  
SPRINGFIELD, VERMONT

Gentlemen: Please send me your Bulletin 998.

M

Name . . . . .

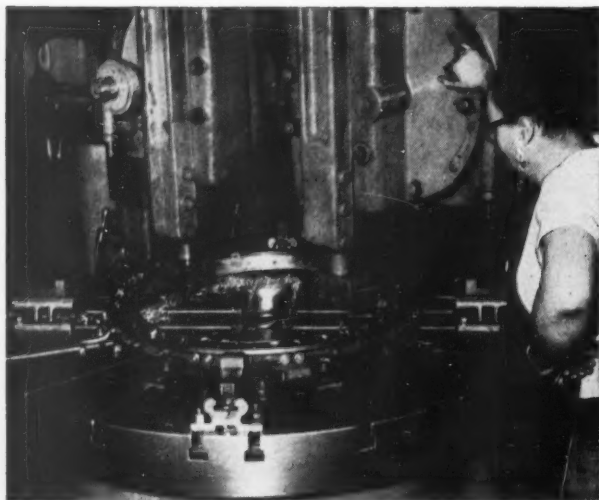
Title . . . . .

Company . . . . .

Street . . . . .

City . . . . . Zone . . . . . State . . . . .

# Impact Resistance Helped These Jobs PAY OFF

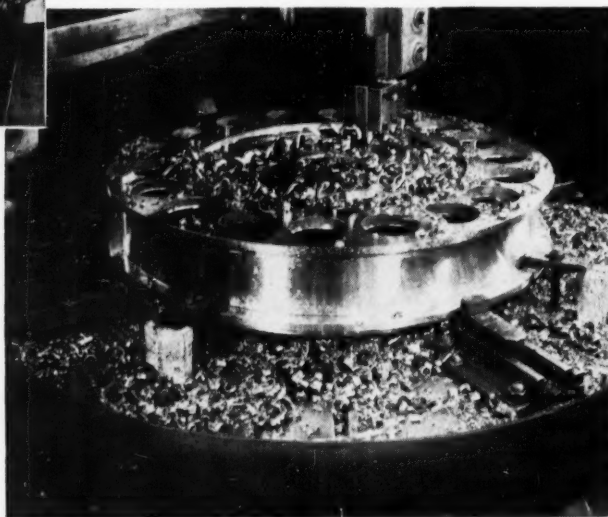


## 40 PER CENT MORE CASTINGS PER GRIND

20 cubic inches of metal per minute are removed from this 18-8 stainless steel casting by HAYNES STELLITE 98M2 alloy tools. The tools make 18 interrupted cuts per revolution as they machine the entire face of this 54 inch casting. Despite the severe operating conditions, HAYNES STELLITE tools turned out 40 per cent more castings per grind than any other tools tested. Cutting speed is 100 surface feet per minute, the depth of cut averaged  $\frac{1}{4}$  in., and the feed is  $\frac{1}{16}$  in. per revolution. No lubricant was used.

## 6 TIMES MORE RINGS PER GRIND

HAYNES STELLITE 98M2 alloy tools machine six of these stainless steel rings per grind. They remove 55 cubic inches of metal in 15 minutes while making interrupted cuts across two weld seams, 12 bolted sectors, and 36 bolt holes. Tools previously used failed before one ring was finished. The metal being machined is 321 stainless steel. The depth of cut is  $\frac{1}{4}$  inch, and the speed is 160 revolutions per minute.



## IMPACT RESISTANCE PLUS RED HARDNESS



The ability of HAYNES STELLITE tools to resist impact from intermittent and irregular cuts, chatter, and shock loading, is the main reason they were successful on these jobs. The tools are hard, too, and retain their hardness at red heat. This combination of properties guarantees fast metal removal; makes deep cuts at heavy feeds possible even under the toughest conditions.

← A manual on cutting tool practice has been prepared to help you use HAYNES STELLITE tools to advantage. Write to any of our District Offices listed below for your free copy.

# HAYNES STELLITE

Trade-Mark

## *Metal Cutting Tools*

The original cobalt-chromium-tungsten metal-cutting tool.

"Haynes Stellite" is a registered trade-mark of Union Carbide and Carbon Corporation.

### Haynes Stellite Company

A Division of

Union Carbide and Carbon Corporation



General Offices and Works, Kokomo, Indiana

Sales Offices

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Los Angeles — New York — San Francisco — Tulsa

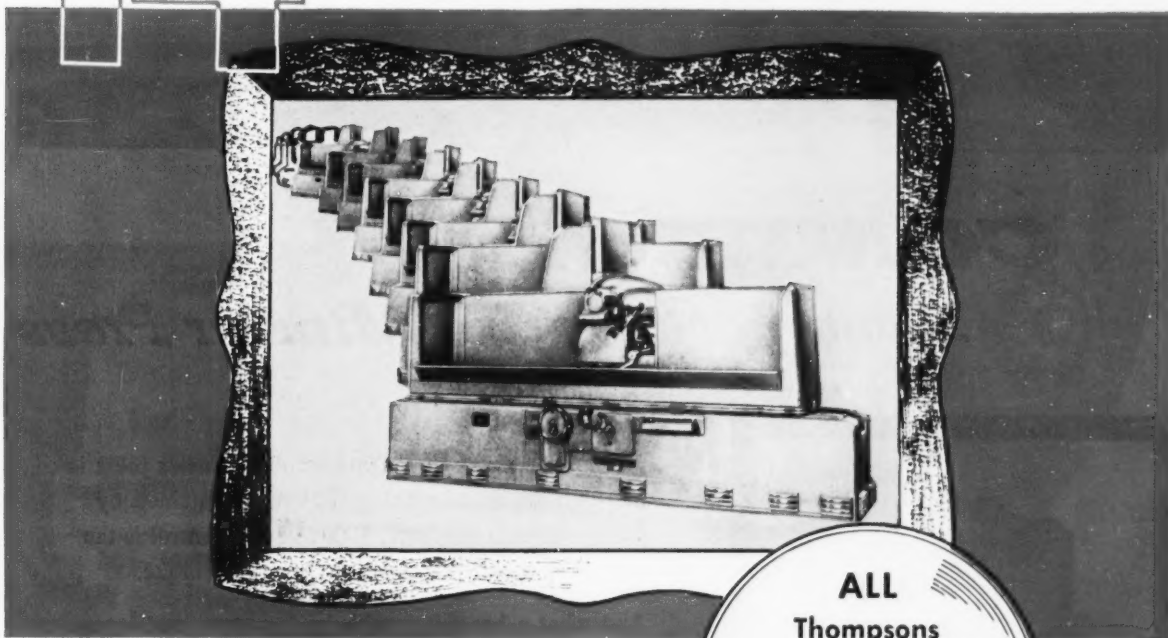


LOOK CLOSELY AT THIS PICTURE

OF GRINDER PRODUCTION AND SEE WHY...

# 14 *is a lucky number*

for a manufacturer requiring precision grinding



After twelve years continuous manufacture of precision ground products, ten Thompson Surface Grinders proved so efficient and economical that this manufacturer ordered four more machines.

Thompson Grinders are available in a wide range of types and sizes from 6" x 18" to 72" x 384" to meet all production, special or tool room grinding requirements. The Thompson line includes machines from giant Hydrial Way Grinders to automatic Truform Jet Blade Contour Grinders, Dual Rotary Grinders and Broach Grinders.

CONTACT THOMPSON TODAY FOR HELP WITH YOUR MACHINING PROBLEMS

**THE THOMPSON GRINDER COMPANY**

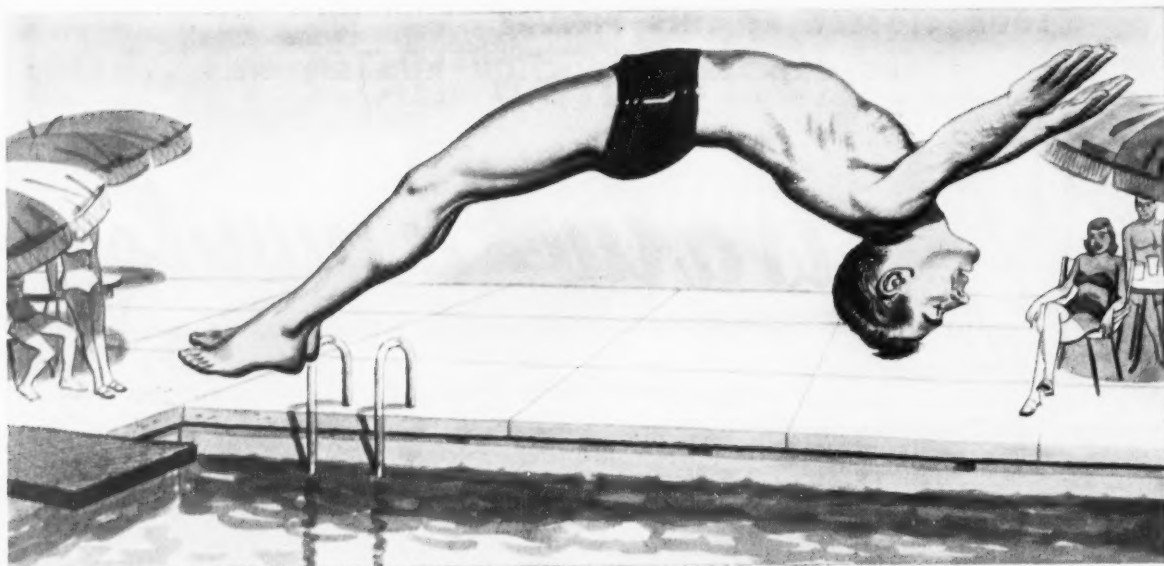
**Springfield, Ohio**

ALL  
Thompsons  
operated continuously  
with much  
**LESS  
DOWNTIME**

*that's why*

it will pay you  
to invest in

**Thompson  
Grinders**



## **CONTROL**

*...you get it with a Minster Press*



Minster P2 "Piece-Maker" press, one of eleven press series. Engineered for high production and long die life.

**MINSTER**

FIRST IN PRESS DESIGN

■ One of the standout features of a Minster press is the high degree of machine control maintained by the operator at all times. Heart of this control is the Minster combination friction clutch and brake.

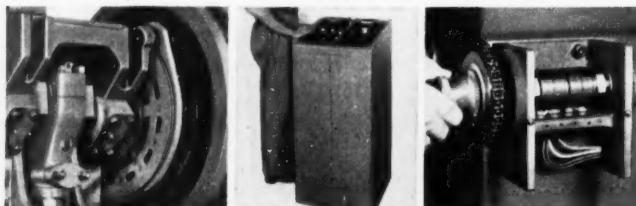
And what a heart it is with its fast starts and stops . . . smooth engagement . . . instant response . . . and added protection in event of air or power failure. Press control is important, not only in actual operation, but in maintenance, set-up, and adjustment. You get it all with a Minster.

**THE MINSTER MACHINE COMPANY, MINSTER, OHIO**

Minster combination friction clutch and brake. Unequalled control plus a remarkable performance record for long-time, trouble-free operation.

Minster pedestal mount, one of many control station variations available to meet individual requirements for press operator performance.

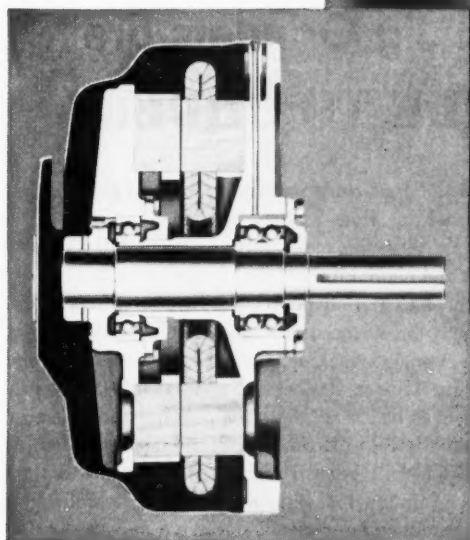
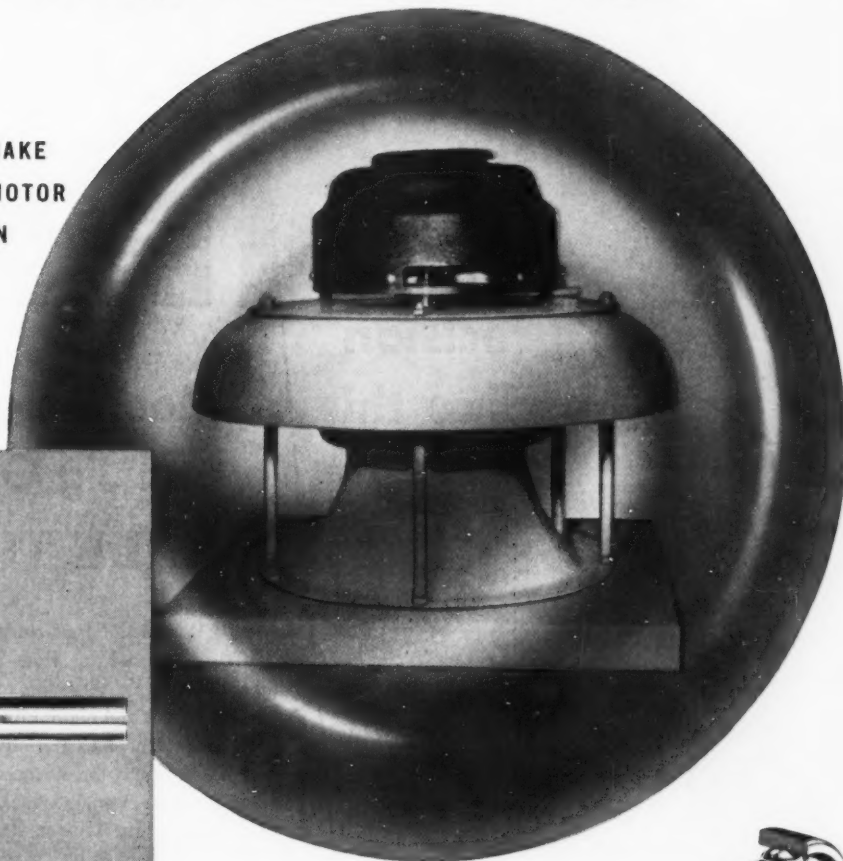
Minster rotary limit switch. Small, compact, trouble-free and with non-bouncing contacts. Easily adjusted to changes in press speed.



# BALL BEARINGS BEST...

...for Space-Saving, Streamlined Designs!

NEW DEPARTURES HELP MAKE  
THIS FAIRBANKS-MORSE MOTOR  
A MASTERPIECE IN DESIGN



NOTHING ROLLS LIKE A BALL



New Departure's angular-contact, preloaded double-row ball bearing gives maximum resistance to deflection under *all* load conditions. In the Fairbanks-Morse axial air-gap motor, this bearing assures rigid, permanently accurate support for the rotor. The air gap is maintained with uniformity under *all* loads and mounting positions. Adjustments are never needed—and that means peak motor efficiency *at all times*.

Remember—New Departure is always ready to help with your bearing problems. Talk with your New Departure engineer *now!*

## NEW DEPARTURE BALL BEARINGS

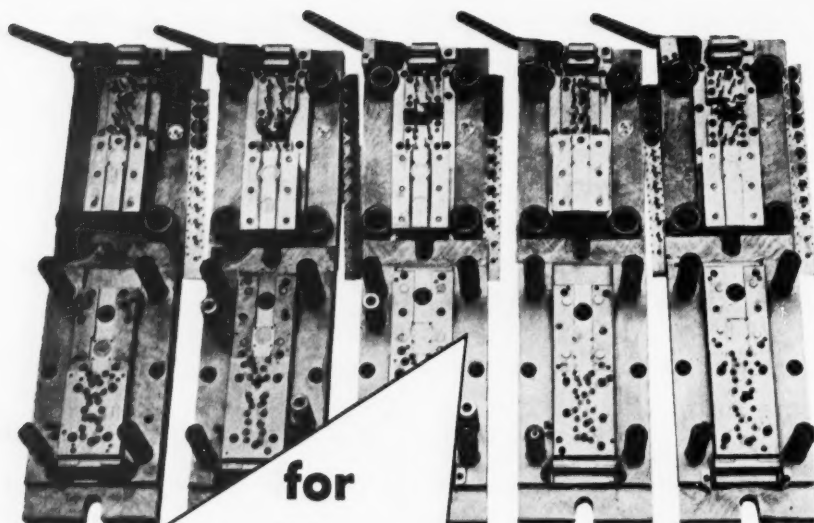
NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT  
Plants also in Meriden, Connecticut, and Sandusky, Ohio  
In Canada: McKinnon Industries, Ltd., St. Catharines, Ontario

### NEW DEPARTURE SALES ENGINEERING OFFICES—AT YOUR SERVICE

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**PITTSBURGH** Cathedral Mansions Mayflower 1-8100  
**CHICAGO** 332 So. Mich. Ave. Wabash 2-5875  
**DAVENPORT** 2212 E. 12th St. Davenport 7-7522

**KANSAS CITY** 1021 E. Linwood Blvd. Valentine 4939  
**MILWAUKEE** 647 W. Virginia St. Broadway 6-9460  
**ST. LOUIS** 3001 Washington Blvd. Franklin 6533  
**LOS ANGELES** 5035 Gifford Ave. Logan 8-2301  
**BERKELEY** 1716 Fourth St. Landscape 6-8750  
**SEATTLE** 5000 First Ave., S. Lander 5920



for  
precision  
jobs like this.... Moore Jig Borers  
and Jig Grinders are  
**"MADE TO ORDER"**



**NO. 2 MOORE JIG BORER.**  
Range 10" x 16" x 16" height.  
Features infinitely variable  
spindle speeds, three power  
feed ratios, centralized controls.



**NO. 2 MOORE JIG GRINDER.**  
Range 10" x 16" x 16" height.  
Grinding speeds from 12,000  
to 60,000 rpm. Infinite feeds  
up or down; spindle-housing  
heat control; features slot  
grinding attachment.

Moore Jig Borers and Jig Grinders are made to order for jobs that require precision hole location—and plenty of it.

Take, for example, these five progressive compound dies used to pierce, shave, gut and blank intricate timing-device parts.

Holes in punch plate and stripper were jig bored in a No. 2 Moore Jig Borer. Holes in the corresponding die parts were jig bored in the same precision machine, hardened and then jig ground in a No. 2 Moore Jig Grinder. Perfect line-up was insured, since all holes had to be held to  $\pm .0002"$ , both for position and hole size.

The No. 2 Moore Jig Borer, with its built-in system of accurate lead screws, can spot, drill, bore or ream all holes in a workpiece to "tenths" with minimum tool changes. The No. 2 Moore Jig Grinder can accurately contour grind, slot grind and form grind die sections, in a third of the time required by other means.

These Moore toolroom teammates provide a one-two punch that can knock the fat off your diemaking costs. They supply an *Engineered Hole Location Service* that permits tool and die sections to be produced concurrently...puts diemaking on an interchangeable-parts-and-assembly basis...lengthens die life...saves you time and money all along the line.

Write today for our detailed literature that pictures and describes many toolroom and production jobs for which Moore Jig Borers and Jig Grinders are made to order.

**MOORE SPECIAL TOOL COMPANY, INC.**  
734 Union Ave., Bridgeport 7, Conn.

**ADD  TO YOUR TOOLROOM**

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES



# CUSHMAN

gives you **CHUCK-ABILITY**

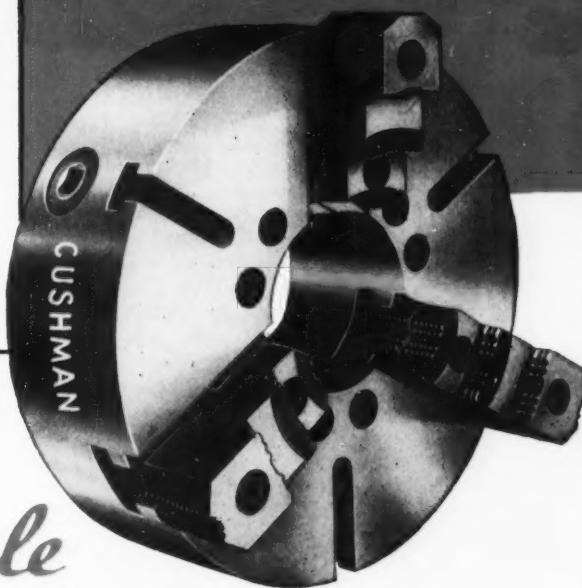


## **CHUCK-ABILITY:**

The ability to **SPEED**  
your work... **ELIMINATE**  
fatigue... **IMPROVE**  
your products... and  
**REDUCE** your costs...  
through design and  
selection of the right  
work-holding devices.

*Remember:*

*You can't machine it right  
unless you hold it right*



*an example*

... of this is Cushman's 3-Jaw Heavy Duty Self-Centering Chuck for use on turret and automatic lathes. This chuck is but one of many types of manually operated chucks designed and built by Cushman to serve the metal-working industry with long life and continued accuracy. True heavy-duty construction with ample sections, correct weight distribution and precision balance makes these chucks a first choice with heavy-duty machine tool builders. These chucks are given a thorough inspection to meet present-day high standards of precision.

Find out what Chuck-Ability can do for you... write Cushman for Catalog No. 65-1953 fully describing and illustrating our Manually Operated Chucks... or, should you have a special work-holding problem, consult the Cushman Engineering Department.

## **THE CUSHMAN CHUCK COMPANY**

815 Windsor Street

Hartford 2, Connecticut, U.S.A.



*Manufacturers of*

A WORLD STANDARD FOR PRECISION

Air Operated Chucks, Cylinders, and Accessory Equipment... The Cushman Power Wrench... Cushman Manually Operated Chucks and Face Plate Jaws.

Ask your  
*Industrial Distributor*

the best running mate your product can have—

# DELCO MOTORS

Every Delco motor, large or small, is engineered and built to assure the uninterrupted usefulness of the product it ultimately will serve. In the wide range of Delco fractional and integral motors, you can be sure that you will find the best running mate *your* product can have.

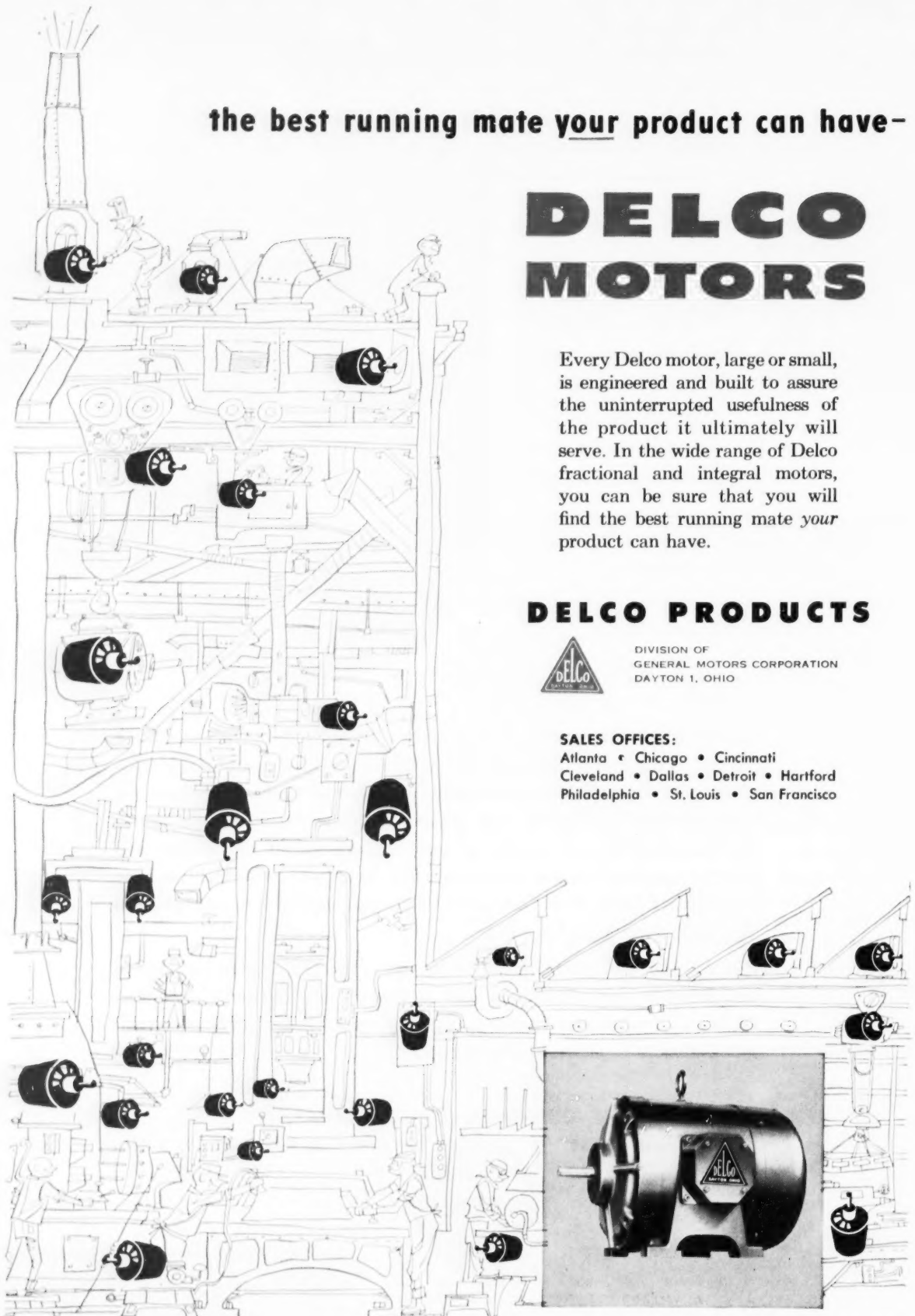
## DELCO PRODUCTS



DIVISION OF  
GENERAL MOTORS CORPORATION  
DAYTON 1, OHIO

### SALES OFFICES:

Atlanta • Chicago • Cincinnati  
Cleveland • Dallas • Detroit • Hartford  
Philadelphia • St. Louis • San Francisco



# balanced



# design



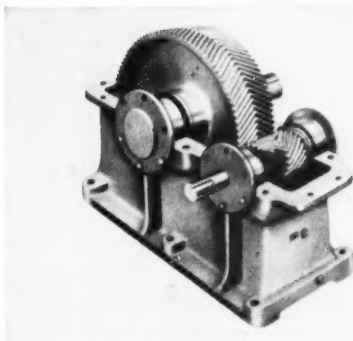
**BALANCED DESIGN** . . . adds to the life of Philadelphia Herringbone Gears and Speed Reducers. In addition to the Sykes continuous tooth, Philadelphia also manufactures Staggered or Separated tooth gears of the Herringbone type in sizes up to 150 inches diameter. For heavy duty industrial drives, the Herringbone Gear provides maximum efficiency and economy.

**EFFICIENT**, because overlapping tooth design provides smooth, quiet power transmission with almost no power loss between gears.

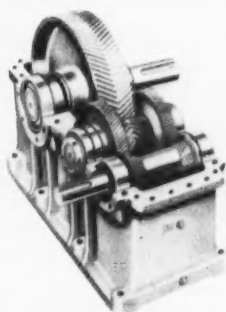
**ECONOMICAL**, because the Herringbone tooth design has greater inherent strength, thus permitting the use of gears of less dimensions than might otherwise be employed. Also, the balanced axial thrust forces eliminate the necessity of heavy bearings to absorb these forces.

The balanced design of Philadelphia Herringbone Reducers is carried one step further in completely balanced gear units. Philadelphia reducers, illustrated below, show how the Herringbone and opposed helical gears are nestled within one another,—thus providing a wide, stable housing with balanced gear and bearing loads.

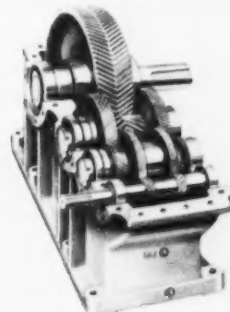
Write for Catalogue H-49.



Single Reduction Type



Double Reduction Type



Triple Reduction Type

## PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.  
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

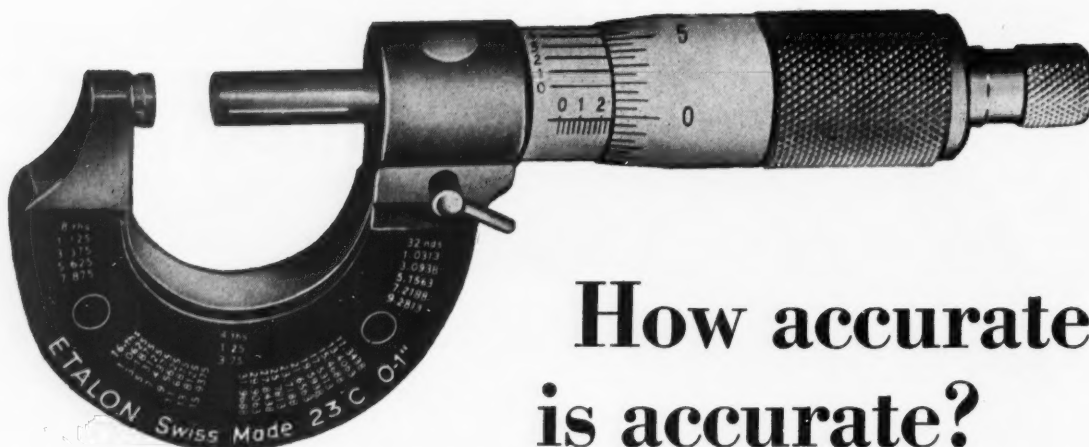


Industrial Gears & Speed Reducers

Limitorque Valve Controls

For more information on products advertised, use Inquiry Card, page 245

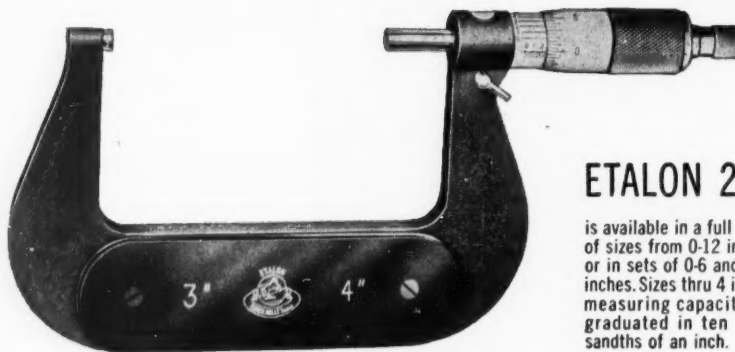
MACHINERY, June, 1954—145



## How accurate is accurate?

### ETALON 23C

is the only micrometer having a thimble graduated in both .001 and .0005 of an inch. These micrometers feature extra heavy duty TUNGSTEN CARBIDE measuring faces, a quick acting lock, and a one piece STAINLESS STEEL screw.



### ETALON 23C

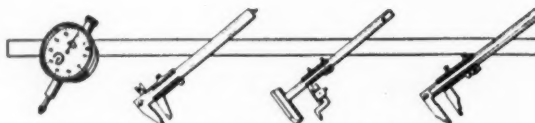
is available in a full range of sizes from 0-12 inches, or in sets of 0-6 and 6-12 inches. Sizes thru 4 inches measuring capacity are graduated in ten thousandths of an inch.

**A**ccuracy means different things to different people.

One shop may let minor variations in machining accuracy "pass" for the sake of speed . . . but he runs the risk of rejects. Another will not permit any lowering of standards . . . but he knows the extra effort is worthwhile.

If you want utmost speed and accuracy in your operations . . . if your products must be able to stand the most careful inspection . . . if you demand consistent precision and quality at moderate prices, then specify ETALON.

Manufactured of special Stainless Steel, hardened and normalized, ETALON micrometers, calipers, height gauges, and various other precision measuring instruments are bringing America's top manufacturing plants a standard of *unfailing accuracy* that insures *faithful customers*.



Ask your dealer to show you the complete selection of ETALON instruments or write

### ALINA CORPORATION

401 Broadway, New York 13, N. Y.

In Canada: Swiss Instruments Co. Reg'd., Granby, Quebec



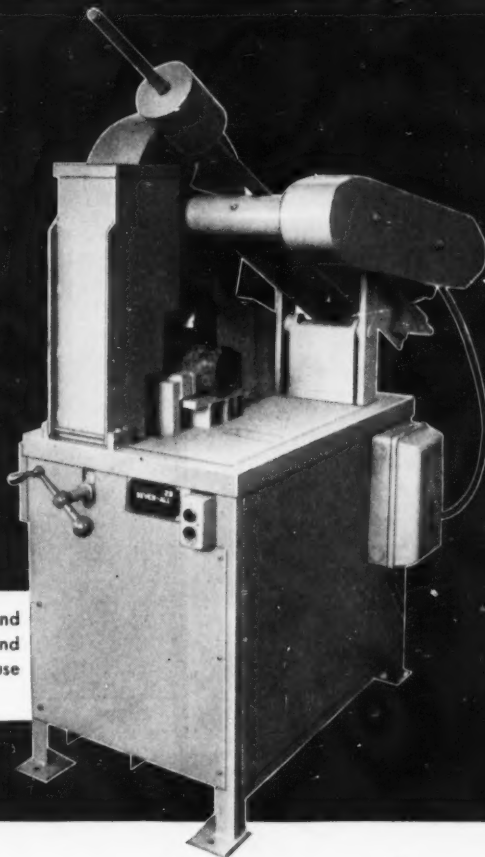
an  
**ACCO**  
product

# Campbell Abrasive Cutter

## New Model 28 Campbell Sever-All Dry Cutter

- Compact
- Portable
- Ideal for contract or construction work

**CAPACITY:** Solids up to 4" x 4" square, angles and channels to 8", tubes and pipes to 4" O.D., 4" angles and channels and 4" O.D. pipe at 45° angles. Based on use of 18" cutting wheel and 10 H.P. motor.



## Here's a versatile cutter you can take to the job

• This new CAMPBELL Model 28 SEVER-ALL Abrasive Cutter is a dry-cutting machine which combines the capacity for a wide variety of cutting operations with a compactness which permits a portability seldom found in cutters of its type and capacity. It is ideal for cutting all types of material in contract or construction work. Can be supplied with work stop and with wheels for easy movement from job to job.

From front to back, the SEVER-ALL measures but 56". It is only 32" wide and 62" in height. Other important features include:

1. Work clamped on both sides of cut by hand-operated, self-centering work holders. Can be supplied with foot-operated treadle.

2. Time of cut is approximately 3 seconds per square inch of material.

3. Operator safety provided by complete enclosure of cutting wheel during operation—except for openings to clear the work.

4. Lowering of guard permits accurate location of work, permits long pieces to be placed in machine without threading through.

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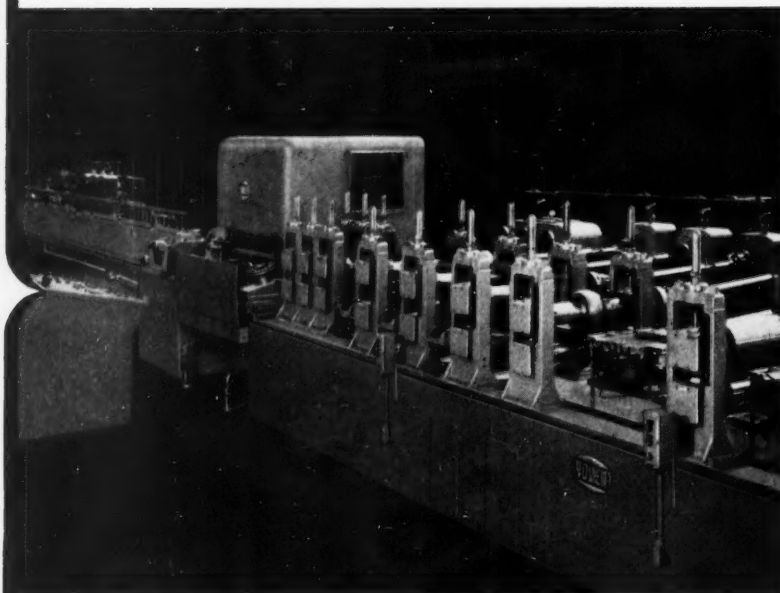
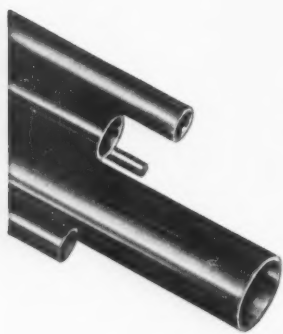
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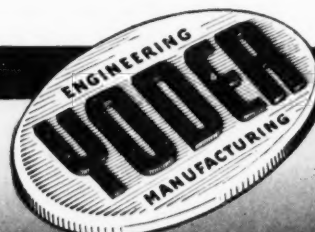
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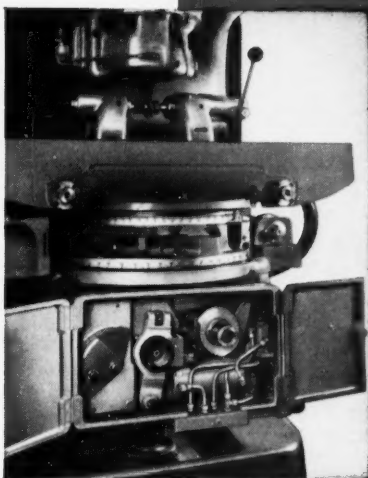
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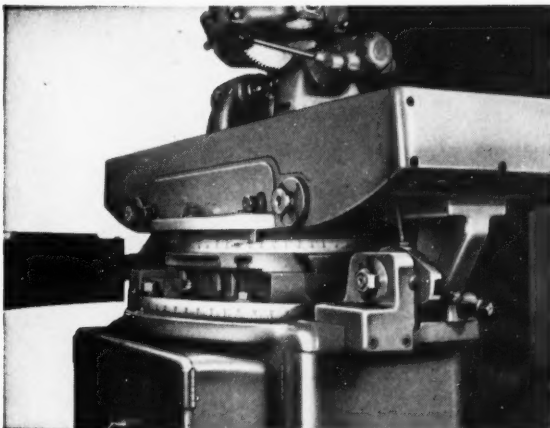
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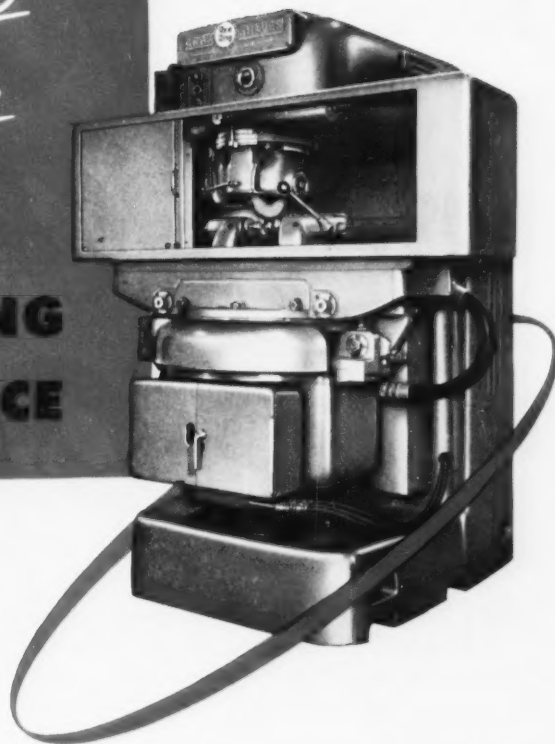


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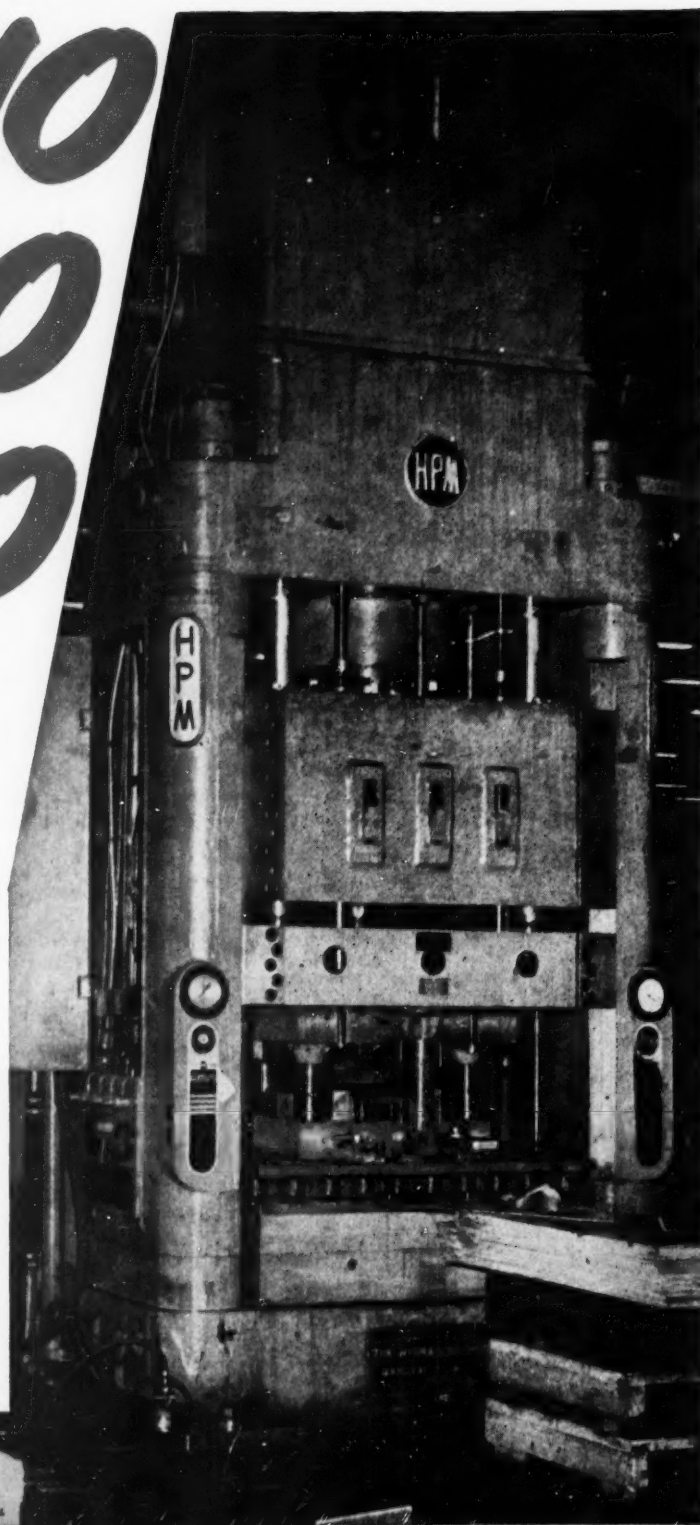
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By LORING F. OVERMAN

## Machine Tool Outlook Under Military Spending Plans

**J**UDGING from recent goings-on in Washington, man has just about completed the cycle from the era of the caveman with his stone axe to the new cave age with intricate machine tools and other war materiel stored underground.

The United States Air Force is reported to be making plans for underground storage, presumably in a cave or abandoned mine, of machine tools and production equipment in excess of current requirements. A proposed site is under consideration, with \$5,000,000 as the estimated cost of preparing for 2,000,000 square feet of space. Wherever possible, however, equipment will be stored in plants in which they have been used.

### Spending Down, But High

When expenditures are reckoned in tens of billions, lopping off a billion or so may not seem to affect the total too much, but it has a tremendous result on the suppliers of the items discontinued. The Department of Defense has estimated that military spending will be down for fiscal 1954—down to \$41,000,000,000. The estimate was \$43,200,000,000 a year ago. This February, the total was amended to \$41,500,000,000 and the current estimate has since shaved off another \$500,000,000. Expenditures for fiscal 1954 will exceed authorizations for the year by approximately \$7,000,000,000—the difference has accumulated from programs in the build-up stage.

**A**LTHOUGH over-all military spending will be down somewhat in fiscal 1955, Assistant Defense Secretary McNeill indicates that this will not affect the current level of procurement for military hard goods. The principal drop will be in maintenance and operation items rather than in planes, ships, electronics, and guided missiles. Procurement of guided missiles will be up 50 per cent, but research and development expenditures are expected to be down slightly.

### Machine Tool Outlook

How the machine tool industry is to fare under the new schedule is not exactly certain. It is interesting to note that recent lists of firms which were granted certificates of necessity contain very few names of production equipment builders.

The Defense Department is still holding \$250,000,000 in its "rainy day fund," appropriated by Congress for special tooling and facilities having little or no commercial application. Lyle S. Garlock, Deputy Comptroller for Budget, Office of the Secretary of Defense, explained to the House Appropriations Committee that the cutback in military procurement has made it possible to use left-over funds to cover costs of tooling and facilities.

Mr. Garlock asked that the machine tool authorization be carried forward into the coming year. He indicated that the Military plans to use the money to buy large tools that take a long time to build, particularly those having no normal commercial use, and for establishing plants that will make items not readily procurable from normal civilian production.

"There are areas," said Mr. Garlock, "where we still do not have the quantity of tools and facilities needed to have an adequate mobilization base." He did not tell the Committee the over-all amount to be used for machine tools and tool facilities, but indicated that at least the \$250,000,000 is to be obligated in the 1955 fiscal year, although only \$150,000,000 is to be actually paid out by the end of that year.

### Expansion of Titanium Production Facilities

Those who build the machines to shape defense metals will be interested in a Washington suggestion that efforts should be made to encourage commercial use of the "wonder metal." Testifying before the House Appropriations Committee,

Kern D. Metzger, Chief of the Air Force Production and Resources Division of the Air Materiel Command, observed: "In my opinion, it is highly desirable that we create as rapidly as possible a titanium industry paralleling the aluminum, copper, and steel industries. So long as titanium remains a purely military material, the production of it will follow military demand and will permit little or no expansion of our current production schedule. All the titanium now produced is being subsidized by Federal funds. There are sufficient titanium ores within the borders of the North American Continent to make this country self-sufficient for hundreds of years to come."

### Renegotiation Deadline Extended

Machinery manufacturers whose government contracts may possibly be subject to renegotiation will welcome a new ruling of the Renegotiation Board. The Board has issued an amendment to its regulations setting June 1, 1954, as the final date on which contractors whose fiscal years ended during December, 1953, may file the financial statements required of them for that year. This is a month's extension of the deadline. Pending Congressional action to extend the Renegotiation Act, the Board has deferred indefinitely the reports required of contractors and subcontractors whose fiscal year began in 1953 and ends in 1954.

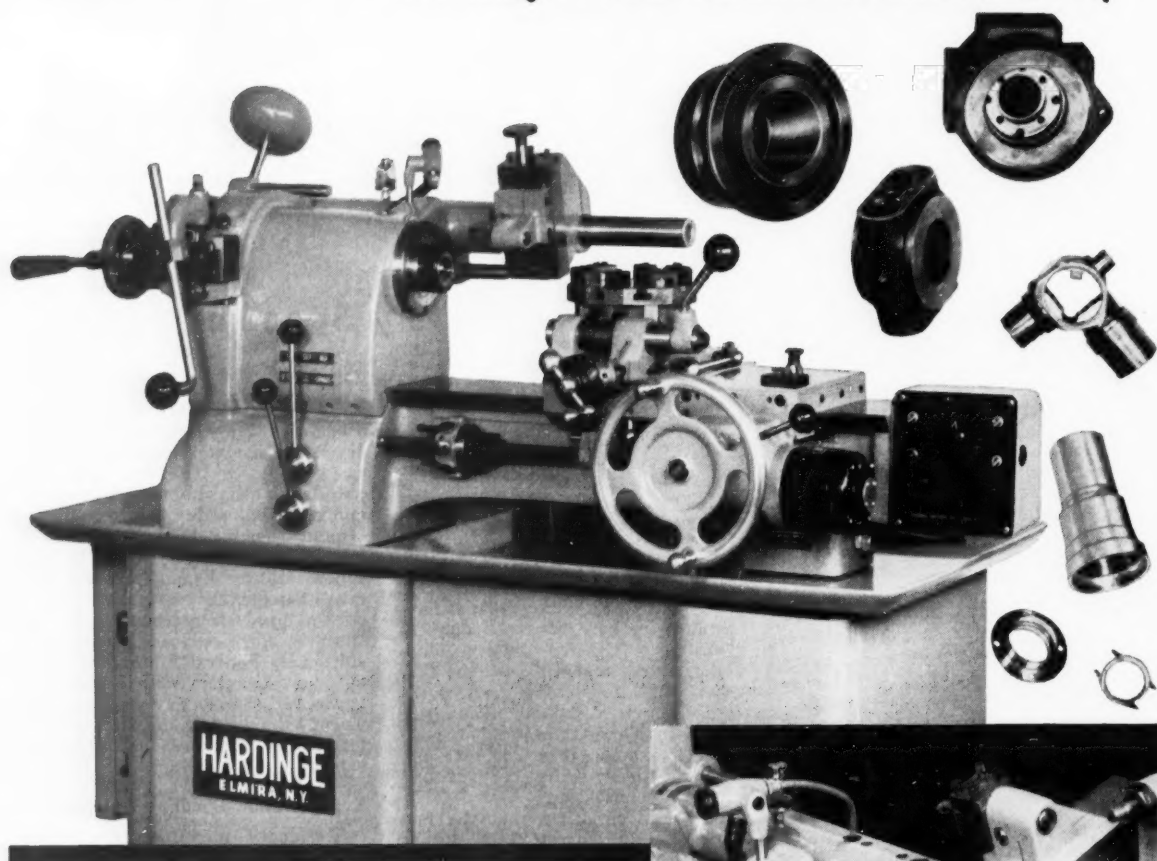
**T**HE Atomic Energy Commission announced on April 20 the release of eighteen patents for public use on a royalty-free non-exclusive basis. The total number of patents and patent applications released to that date by the Commission was 658. Copies of the patents may be obtained from the U. S. Patent office. Applications for licenses to use them should be filed with the Chief, Patent Branch, Office of the General Counsel, Atomic Energy Commission, Washington 25, D. C.

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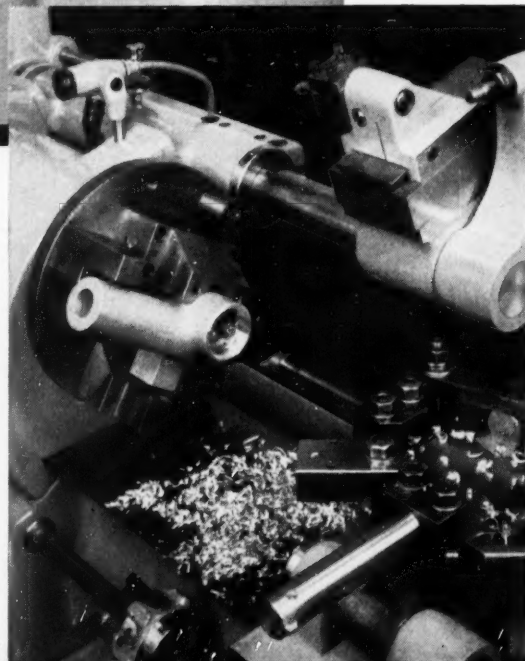
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## *Are People Too Proud to Sell?*

**B**ACK in the days when the automobile industry was growing by leaps and bounds, it was common practice for automobile salesmen to drive a car right up to the home of a prospective customer and offer a demonstration. The car was put through its paces—climbing steep grades, making quick getaways, and performing generally. All the while, the salesman pointed out its features and discussed price and payment arrangements.

Today, even though automobile dealers are complaining about heavy stocks on hand, they expect buyers to come to their showrooms and make the first move toward purchasing a new car. Dealers seem to be awaiting another lush sellers' market. Tried-and-true sales methods of the past have been discarded. Even telephone calls to previous customers inquiring about their plans, if any, for replacing their automobiles appear to be considered undignified on the part of car dealers.

Other businessmen possess the same selling lethargy. A recent experience was that of a house owner who planned extensive remodeling of the kitchen in his home. He and his wife called on a contractor who specializes in kitchen equipment and asked for a suitable lay-out, together with a price quotation. After several days, the couple was asked to call on the contractor—instead of the reverse, as in the oldtime selling days. A plan was presented and the cost quoted as \$2083.

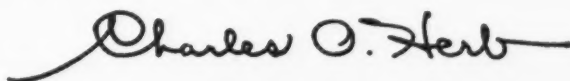
The prospective customers signified their satisfaction with the plan but made a tentative offer of an even \$2000. Weeks passed and there was no follow-up on the part of

the contractor. The prospective buyers were actually willing to pay the price asked, but the contractor did not make the effort to find out. Apparently the customers were expected to make the next move.

What is the reason behind such dilatory selling methods? Are manufacturers and merchants too proud to sell by the old-fashioned methods? Do they blindly accept the adage about the mousetrap? Few businesses ever prospered on the concept that customers will beat a path to their door.

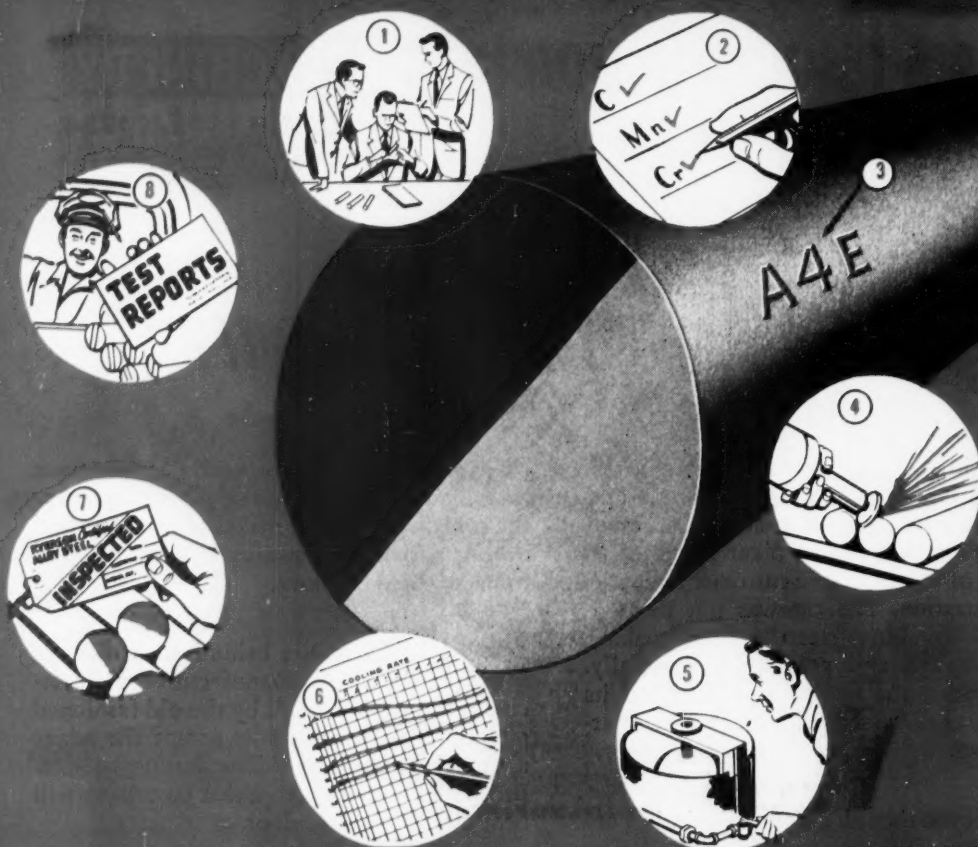
Machine tool builders and distributors, keenly aware of selling problems during successive buyers' markets, several years ago established a short summer refresher course for their sales staffs which has become an annual program. Selling fundamentals are reviewed and common problems discussed. Participants in these courses generally return to their jobs with renewed enthusiasm for their work and more effective selling ideas.

A tremendous potential market exists for modern machines and tools in the replacement of obsolete time-consuming equipment tied to the manufacturing practices of bygone days. After all, over \$16,000,000,000 of the estimated money to be invested this year in plants and equipment will be spent for modernization rather than plant expansion. Machine and tool manufacturers have made amazing developments that point the way to increased product quality at lower cost. But these developments must be sold to plants that can profit by their use. Active sales cultivation of prospective customers is the answer to any slack in unsolicited business.



EDITOR





How Ryerson 8-step quality control

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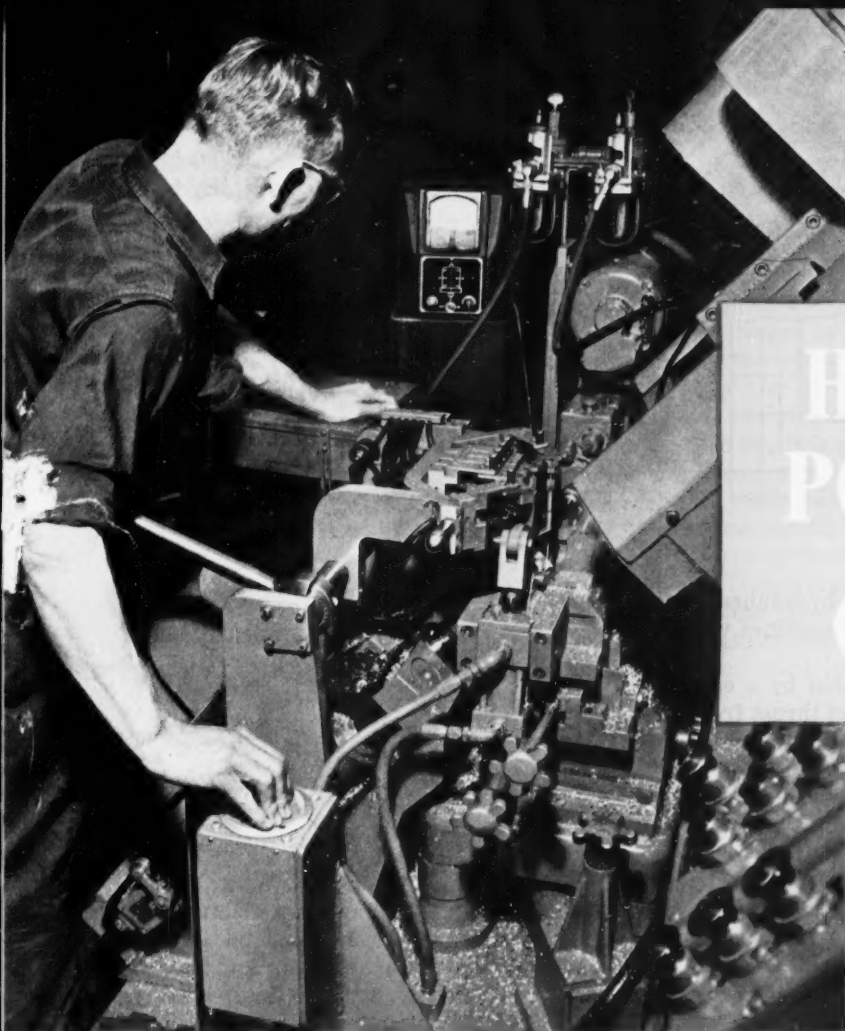
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## HYDRAULIC POSITIONING AND CLAMPING

Outstanding examples of  
hydraulic jigs, fixtures,  
and special machines em-  
ployed by Ford Motor Co.  
in England

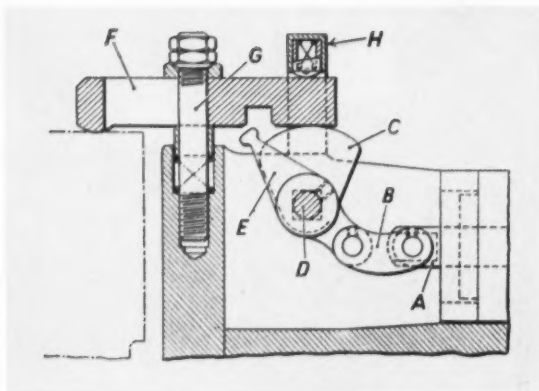
**A**LTHOUGH hydraulic power is widely employed for the operation of presses and machine tools, its application to work-holding jigs and fixtures has not been too extensive. Hydraulic power does, however, offer several advantages for positioning and clamping work, which offset the higher initial cost of this system.

High unit pressures that can be employed with hydraulic power permit the use of small-diameter cylinders and pipes in comparison with the forces exerted. Thus, compactness in the design of the hydraulically operated equipment is possible. Also, since oil is generally employed as the hydraulic fluid, the mechanism is self-lubricating. The positive action of hydraulic rams, due to the virtual incompressibility of the fluid, is of particular importance where feeding movements are required.

Modern high-efficiency motorized pumps provide a considerable degree of flexibility, and enable compact pump and reservoir units to be installed adjacent to a machine or group of machines. The units can supply several fixtures, each

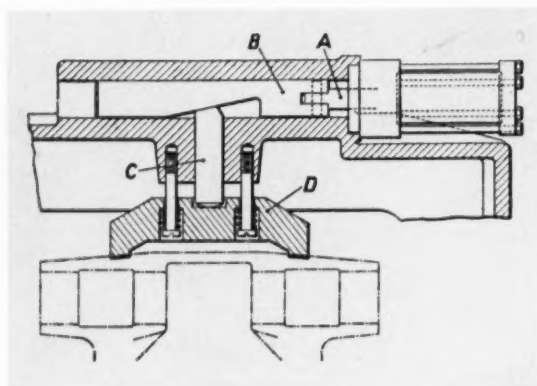
of which may incorporate a number of rams. Alternatively, many hydraulically operated machine tools incorporate a hydraulic power "take-off" for the supply of pressure fluid for fixture operation. Both systems facilitate the rearrangement of the machines should the need arise, and are advantageous for line production since the quantity of piping is kept to a minimum. In the event of a failure of the hydraulic supply, the effect is localized. Hydraulic valves are available, providing for pressure, volume, and directional control, which can be manually, mechanically, hydraulically, or electrically operated. Thus, pre-arranged operation sequences can be obtained, if necessary, without the attention of the machine operator.

The Ford Motor Co., Ltd., Dagenham, England, uses hydraulic power extensively for jig and fixture movements, and for the operation of many specialized items of equipment employed in the manufacture of their motor cars, tractors, and commercial vehicles. Cylinders, pistons, and other hydraulic units have been standardized, and the pumps and valves are made by Vickers,



**Fig. 1. (Left) Cam-and kicker-operated work-holding clamp, which is actuated by piston-rod (A)**

**Fig. 2. (Below) Simple wedge-operated hydraulic clamp. Spring-loaded member (D) clamps work-piece.**



Inc., Detroit, Mich. Examples of hydraulically operated jigs, fixtures, and special machines will be described in this article.

The clamps employed are operated by a cam and "kicker," or a wedge, or a direct thrust from the piston-rod (with locking by a wedge-actuated device). Clamping arrangements of the direct thrust type are usually applied where the movement of the clamping member is extended. A cam and kicker are illustrated in Fig. 1. The piston-rod A of a hydraulic cylinder is connected by a link B to the lever extension of the cam C. This cam is mounted on the square section of the shaft D, which carries the kicker E secured by a set-screw. The clamp F is supported by a spring on the stud G, and is retained by plain and spherically faced lock-nuts and a spherical seating washer. A spring plunger in the bridgepiece H, contacts the right-hand end of the clamp.

As the piston-rod is retracted by hydraulic pressure, the kicker E engages a slot in the under side of the clamp and thrusts it forward, over the work-piece. Further movement of the piston-rod causes the cam C to lift the right-hand end of the clamp, forcing the opposite end downward against the component. A reversal of the piston movement rotates the cam in the opposite direction, releasing the pressure on the clamp, which is then withdrawn by the kicker.

A simple wedge-operated clamp is shown in Fig. 2, the piston-rod A being coupled to a cylindrical sliding member B, on which is machined an inclined face. The plunger C is thrust downward when the piston moves to the right, and forces a spring-loaded bridge clamp D against the work-piece (indicated by broken lines). A self-locking action is provided by the selection of a suitable angle for the inclined face of sliding member B.

In Fig. 3 is illustrated a method of clamping by the direct action of a hydraulic cylinder, with a wedge for locking the ram in its final position. The piston-rod A of the clamping cylinder passes

through a slot in the wedge B. At the upper end of the rod is mounted the ram C. When the upward movement of the ram has clamped the work-piece against a fixed horizontal locating face (not shown), pressure is admitted to the left-hand end of the cylinder D so that the wedge B is moved to the right and the ram locked in the clamping position, independent of the hydraulic pressure supply. The application of pressure to the opposite end of the cylinder D releases the wedge, allowing the ram C to be lowered. An extended movement of this ram is permitted by the flats machined on its lower end, which enable it to pass through the larger end of the slot in wedge B.

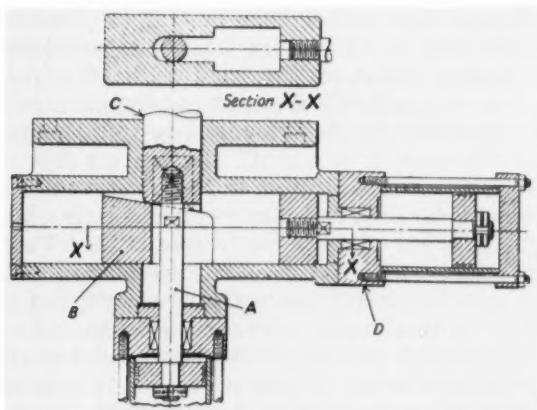
The timing of the oil flow to the clamping and locking cylinders is usually controlled by a sequence valve. However, it has been found that, with the arrangement shown in Fig. 3, a satisfactory action is obtained if both cylinders are connected to the pressure supply simultaneously so that the wedge is held against the side of the ram until the ram assumes a position which will permit a transverse wedge movement. During the latter part of the clamping movement, the ram and the wedge move together until the work-piece is both clamped and locked.

Where space for the clamping mechanism is restricted, the pistons can be made integral with the wedge, as shown in Fig. 4. This clamping device is fitted with a "butterfly" piston to rotate the clamp, when it is in the free position, so that it clears the work-piece. Also, this arrangement provides for timing the sequence of the clamping

operations. The spring-loaded clamp *A* rotates with the sleeve *B*, on which it has a limited axial movement. When pressure is applied to the right-hand end of the piston, the clamp is pulled downward by the rod *C*, due to the action of an inclined face machined on the double piston *D*. Application of pressure to the left-hand end of the piston will release the clamp.

Attached to the sleeve *B* is a circular valve block *E* with its top face milled to form the butterfly profile, as indicated by cross hatching in the lower sectional view. The top plate *F* is provided with the two projections *G*, and holes are drilled to form the ports *H*, *J*, *L*, and *M* with their connecting passages. Holes *K* and *N* join with passages in the main casting that connect with the right- and left-hand ends of the cylinder, respectively, the latter end being provided with an additional inlet *P*.

Initially, the clamp and piston *E* are at 90 de-



passes through the passages in the main casting and the top plate *F* to ports *L* and *M*. Rotation of the butterfly piston is thus effected in the opposite direction to the previous movement.

Clamping pressure is applied in the horizontal and vertical planes by the mechanism seen in Fig. 5. The arm *A* is swung rapidly downward by means of a rack-and-pinion device, actuated by the cylinder *B*. Clamping pressure is then applied by the cylinder *C* through the angular face on the piston-rod *D*, which engages the cam profile on the upper end of the arm *A*. Both cylinders are energized simultaneously, but the piston *D* cannot move downward until the clamp approaches its final position, due to the curved form of the cam.

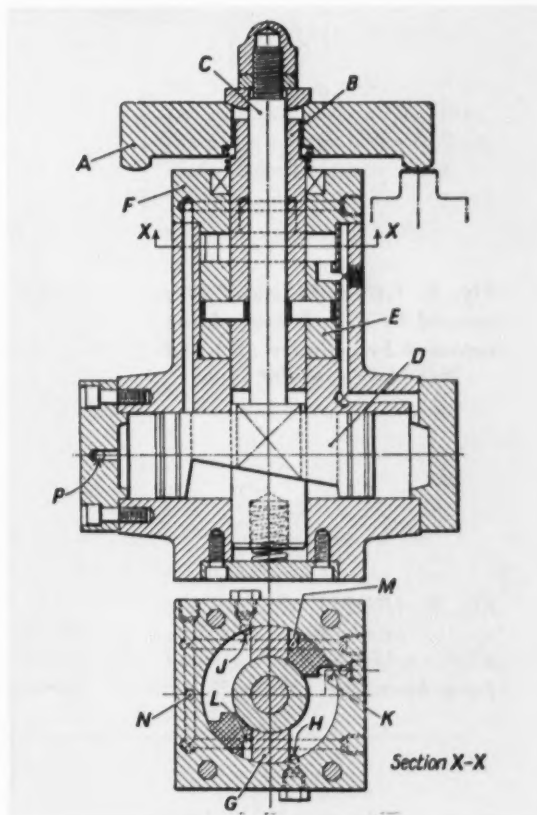
Thrust is applied to a component at 90 degrees to the direction of the clamping pressure by a plunger connected to the cam and kicker clamp illustrated in Fig. 6. The hydraulic cylinder *A*

**Fig. 3. (Left) Direct-acting clamping device fitted with a hydraulically operated locking device**

**Fig. 4. (Below) Wedge-operated hydraulic clamping device with a "butterfly" piston for rotating clamp (*A*)**

grees to the position shown. The ports *L* and *M* are connected through the hole *N* to the left-hand end of the cylinder and to the exhaust, and the piston *D* is at the right-hand limit of its movement. Oil under pressure is admitted by an associated four-way valve to the ports *H* and *J* on one side of the butterfly piston, the oil on the opposite side escaping through the ports *L* and *M* to the left-hand side of the clamping cylinder, which is connected to the exhaust. The piston is consequently rotated until it contacts the projections *G*, as shown in the lower sectional view. Oil under pressure then passes through the port *K* to the right-hand side of the clamping cylinder, forcing the piston *D* to the left, and effecting the clamping movement.

When the setting of the four-way valve is reversed, the port *P* is connected to the pressure supply and the inlets *H* and *J* are connected to exhaust. The piston *D* then moves to the right so that the clamp is released. The oil subsequently





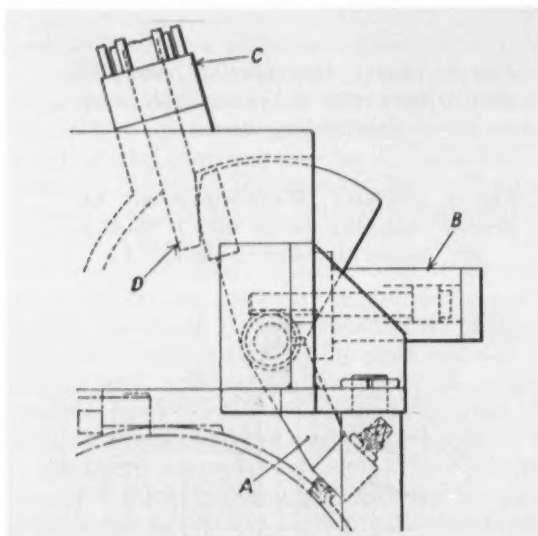
operates the cam *B* and the kicker *C* in a similar manner to that shown in Fig. 1. In this instance, however, the cam *B* has two lobes—one applying pressure to the clamp *D*, and the other imparting motion to the spring-loaded locating plunger *E* through the ram *F*. A degree of compensation is provided for the movements of the clamp and the plunger by a rectangular hole in the cam *B*. This hole allows a clearance for the square shaft *G* in one direction only.

A hydraulically operated centralizing device can be seen in Fig. 7. Two spring-loaded plungers *A* expand radially inside the cored hole of a cast work-piece when oil is supplied to the lower end of the cylinder *B*. The angular faces on the piston-rod *C* bear directly on the inner ends of the plungers, which are fitted with adjustable dome-headed screws. This device insures that the external machined faces are correctly posi-

tioned relative to the cored hole, and that a uniform wall thickness is maintained during a milling operation on a duplex machine.

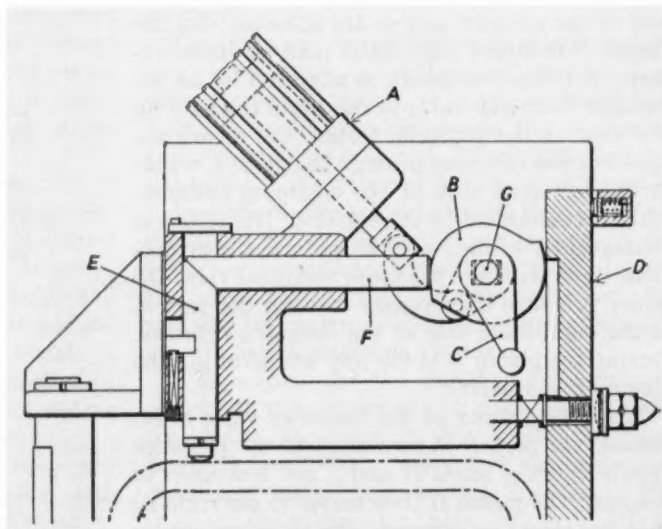
Wherever retractable locating pins are necessary in the fixtures, the standardized design seen in Fig. 8 is adopted. The design incorporates a felt sealing ring and a shroud *A* to prevent chips from entering the elevating mechanism, which comprises a rack, cut on the ram *B*, meshing with a pinion *C*. These devices can be interlocked with the hydraulic circuit in various ways. In the method shown, pinion *C* engages a horizontal rack *D*, connected to an eccentric *E*. Keyed to the eccentric shaft is a cam which is in contact with the plunger of a two-way hydraulic valve. The cam and valve are arranged to direct the oil supply to exhaust when the locating pin is in the "down" position, and to transmit oil to the other valves in the hydraulic circuit when the work-piece is correctly located and the pin raised.

Another method of interlocking is illustrated in Fig. 9. The cylindrical drum *A* can be rotated through 210 degrees by means of an attached lever, and has a helical track cut in its periphery. This track engages a fixed pin *B* so that the drum *A* moves lengthwise during the rotary movement. Concentric with the drum, and moving longitudinally with it, is a shaft which is not free to rotate. Rack teeth cut on this shaft serve to rotate the pinion *C* and thus elevate multiple locating pins, one of which can be seen at *D*. A Vickers rotary, four-way, manually operated valve *E* is used to control the hydraulic circuit, and is fitted with a special operating lever having an enlarged hub provided with a semicircular notch. A spring-loaded plunger *F* enters this notch when the valve is rotated through 45 degrees from the position shown, in order to cut off the hydraulic fluid supply.



**Fig. 5. (Above) Clamp (A) is rotated by a rack and pinion actuated by cylinder (B) and locked by cylinder (C).**

**Fig. 6. (Right) Pressure is applied in two directions by a double-lobe cam (B) operated from hydraulic cylinder (A).**

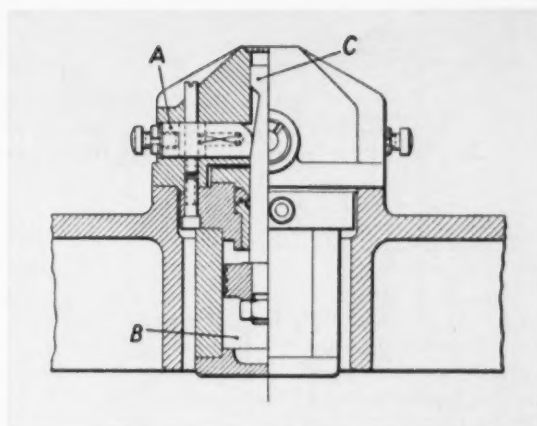




The valve cannot be moved into the "live" position unless the locating pins have been raised and have entered the datum-holes in the work-piece. Under this condition, the plunger *F* is free to move to the right into a clearance hole in the drum *A* as it is depressed by the valve-lever hub during the rotary movement.

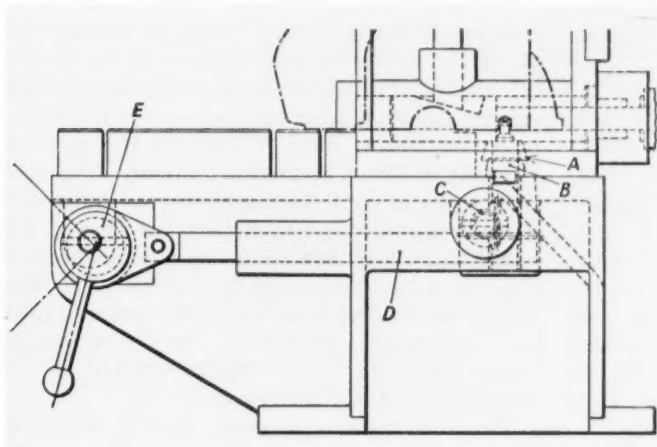
Multiple drilling operations on transmission housings are performed by an automatic transfer machine designed by Ford engineers. The cast housings enter at one end of the machine with a flanged face resting on ways *A*, Fig. 10, and is moved intermittently from one operating station to the next by the fingers *B*, attached to the hydraulically operated transfer shuttles. These fingers are turned inward, move the component through one transfer stage, withdraw, and are then returned to the starting position. At certain stations, one of which is shown, the gear-box casting is rotated through either 90 or 180 degrees so that different faces are presented to the cutter-spindles.

Rams, as at *G*, fitted with locating screws *H*, are provided at these stations. The gear teeth cut in the lower end of each ram engage a rack *J*. This rack is connected to a second rack *L* by an idler gear *K*, at stations where rotation through



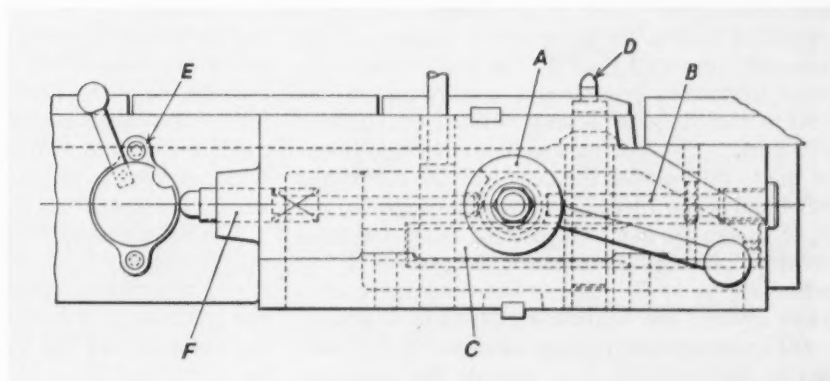
**Fig. 7. Plungers (*A*) in this hydraulically operated locating device expand in the opposite direction to centralize work-piece.**

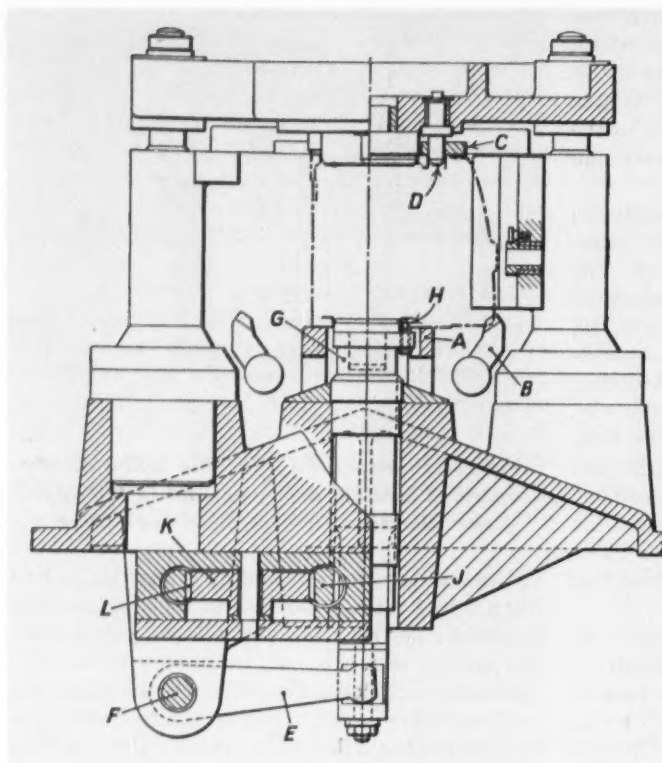
90 degrees is required; and by a gear train, having a 2 to 1 ratio, where a 180-degree movement is needed. The rack *L* is cut on a horizontal shaft, one end of which is coupled to the piston of a hydraulic cylinder. Cam-plates on the shaft trip limit switches for controlling the hydraulic circuit through a solenoid-operated valve, and ad-



**Fig. 8. (Left) Standardized design of retractable locating pin fixture interlocked with a two-way hydraulic valve**

**Fig. 9. (Right) Multiple locating pins such as the one seen at (*D*) are elevated by pinion (*C*). Four-way valve (*E*) controls the hydraulic circuit.**





**Fig. 10. Ram (G) in this multiple drilling, automatic transfer machine lifts the work-piece and rotates it through an angle of 90 degrees.**

justable nuts are fitted to the shaft so that its movement in both directions is limited.

In operation, a casting is positioned by the transfer mechanism over the ram G, which is raised by the action of the lever E fitted to the shaft F, so that the screw H enters a hole in the casting. The work-piece is then rotated through 90 or 180 degrees. At this point, the top plate, carrying the locating pin D, is lowered by a hydraulically operated mechanism to position the casting and clamp it securely against the fixed ways A. A stationary stripper plate C is provided to insure that the component is freed from the upper locating members as they withdraw after the drilling operation has been completed.

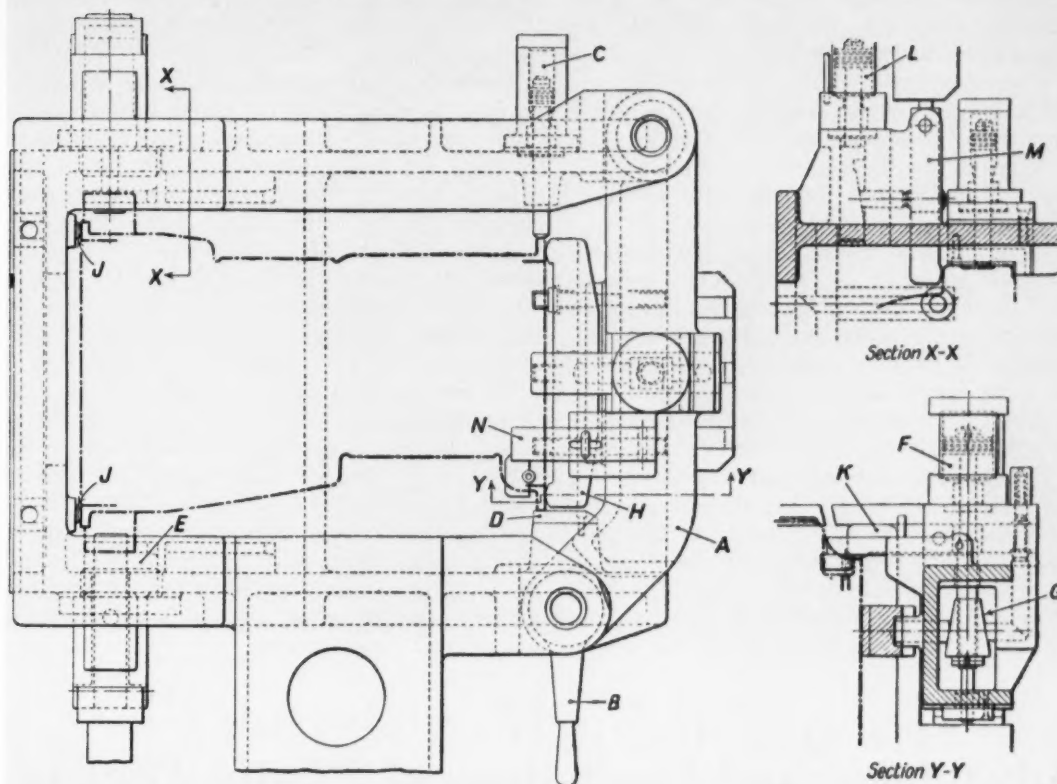
The fixture seen in Fig. 11—employed for boring transmission cases on a Greenlee machine—embodies hydraulically operated clamps in the manually operated gate A. The work-piece, indicated by broken lines, is slid lengthwise into the fixture and the gate assembly closed (as shown). Plungers in the moving member enter the frame of the fixture, under the action of the right- and left-hand screw threads in the lever-operated nut B, to secure the gate. The casting is located from previously machined surfaces, the pistons in two cylinders, as at C, pushing the component sideways against the hardened stop-pads D and E.

Oil under pressure is then admitted to the lower end of the cylinder F to operate the clamping

mechanism incorporated in the gate. The upward movement of the wedge G attached to the piston-rod applies a thrust to two plungers, one of which acts on the bridge-piece H and moves the work-piece lengthwise until it contacts the locating plungers J. These thrust plungers are connected by a series of rods, having 45-degree end faces, so as to equalize the thrust on the face of the flange. A hinged clamp K in the gate is operated through a similar linkage by the wedge G. The wedge has an elongated hole which permits sideways movement, relative to the piston-rod, to insure that equal pressures are exerted on the bridge-piece H and the clamp K.

Two additional cylinders, one of which is shown at L, operate wedge clamps, as seen at M, to hold the mounting bosses on the casting against the horizontal locating faces. A swinging member N carries a drill bushing and is secured in a position over the casting when the gate of the fixture has been closed. This bushing serves to guide the drill in a single spindle auxiliary head, which is used to produce the dip-stick hole while the boring operation is in progress.

The angular location of the tappet holes in the cylinder blocks for Ford automobiles necessitates tilting the work-piece to align it correctly under the spindles of a Baush hydraulically fed drilling machine. At the same time, the block must be moved sideways to allow the guide bushing



**Fig. 11.** To facilitate loading, gate (A) carries the hydraulically operated clamps for milling the transmission case.

**Fig. 12.** Cylinder blocks are lowered and tilted, and then accurately positioned, before being clamped in this fixture.

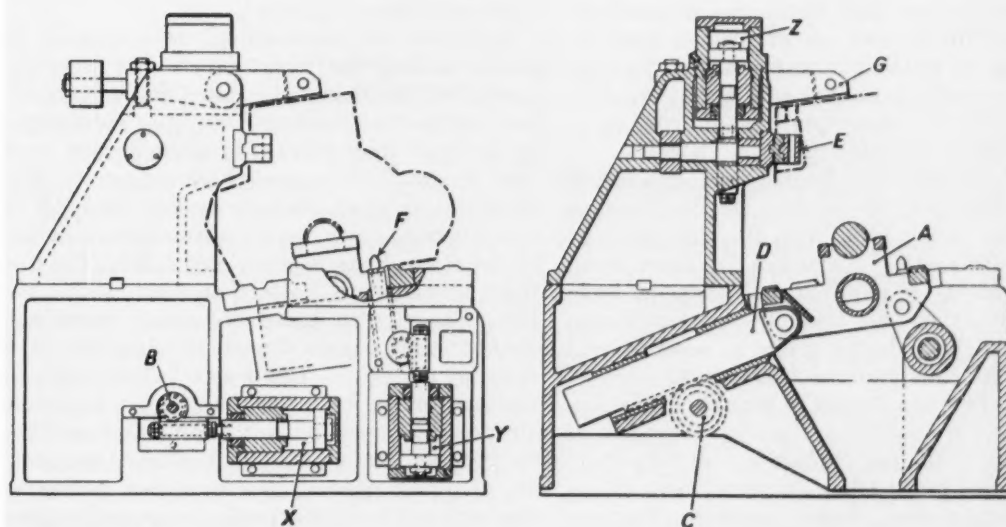


plate to enter a pocket in the casting. Three mechanisms for tilting, locating, and clamping the component are operated in the correct sequence after a main control valve has been engaged by timing valves. These valves are incorporated in the piston-rods of the hydraulic cylinders fitted to the fixture illustrated in Fig. 12. Similar machines and fixtures with different bushing plates, as at *E*, are employed for subsequent semi-finishing and reaming operations.

A latch-stop roughly locates the casting endwise after it has been manually transferred to the fixture from the adjacent roller conveyor. At this stage, the machine table *A* is horizontal and at the same height as the conveyor rollers. The work-piece is located laterally by the crankshaft bearing and cap seats. Oil is directed to the spool of a Vickers pilot-operated, four-way valve by a manual control valve, so that the direction of flow of the main pressure supply is reversed. Consequently, the piston in the cylinder *X* moves to the right, a rack attached to the piston-rod rotating a pinion on the shaft *B*. A second pinion, *C*, on this shaft thrusts the rack *D* to the left, so

that the table *A* is inclined, and also moved in this direction due to the action of the links incorporated in each pivot.

In the inclined position, the component rests on fixed locating pads. Oil under pressure then enters the upper ends of hydraulic cylinders, as at *Y*, to actuate a rack-and-pinion system and raise the locating pins *F*, which align the casting accurately as they enter reamed holes. Three pins are provided, one of which is circular and the other two having flats, so that both four- and six-cylinder blocks can be accommodated in the same fixture. When the casting has been located, oil is directed to the cylinder *Z* to effect the downward movement of the two levers *G*. The rack-and-pinion system actuated by the piston-rod rotates a cam, the movement of which is transmitted to the cylinder block clamping levers by means of push-rods.

After the drilling operation, the sequence of operations is reversed. The clamps are released, the locating plungers withdrawn, and the table raised to the horizontal position in readiness for unloading the component.

## Advantages and Limitations of Plastic Tooling

**W**HEN used where they properly belong, tools of phenolics and other plastics can and have accomplished production improvements and substantial economies in time and money, according to Frank L. Bogart, sales engineer in charge of the Detroit branch of the Marblette Corporation, New York City. Mr. Bogart, speaking at a recent annual meeting of the Steel Plate Fabricators Association, also stated that plastic dies can cost more than metal ones in some applications. The correct use of plastics must be considered in relation to three major types of production runs: a limited run, producing only a few panels for prototypes; a short run, up to 20,000; and an extended run, over 20,000.

Plastics are ideal for limited runs, presenting time savings up to 90 per cent and cost savings better than 50 per cent. With the different type of tool construction demanded for short runs, more durability is required, but phenolics have effectively served this need. In some instances, adaptations have to be made to solve special problems. For instance, when sharp radii are required or there is a danger of wrinkle formation, steel inserts are used to prevent rapid erosion of the plastics. A successful plastics trial for a short run was cited in the truck program of one of the auto manufacturers, where eighteen skins are drawn on plastic tools.

In extended runs, service costs become a big factor. Even though repairs to plastic tooling can be quickly done, some of the advantages of plastics may be lost if they need continued service in contrast to hard metal tooling which will operate smoothly without interruption. On the other hand, some configurations permit long runs with plastics, and they have a valuable interim use in instances where parts are required before metal tooling becomes available.

Examples of outstanding developments in plastic tooling for metal fabrication were described by Mr. Bogart. He noted that a currently used automotive flywheel housing of sheet metal is produced with the use of phenolic dies with steel inserts. The relatively high impact strength of Marblette liquid phenolic casting resin No. 78 was illustrated by a display of two draw dies cast by the Rizzo Bros. Engineering & Mfg. Co., Detroit, and Modern Pattern & Plastics Co., Toledo. These, with metal die shoes, were constructed and panels drawn off them inside a four-day period. Another method of construction was exemplified by a form die for an aluminum aircraft duct made by Automotive Custom Plastic Tooling, Detroit. This tool involved the making of a cast phenolic punch, with a laminated fiber-glass skin on the female, supported by phenolic resin.





## Transfer Machining of Armored Vehicle Hulls

Hulls for armored infantry vehicles are weldments 9 feet wide by 16 feet long, weighing 20,000 pounds. Accurate boring, facing, drilling, and tapping of the hulls are being performed on a 100-foot long transfer machine

By T. L. HALLENBECK  
Vice-President and Director of Engineering  
Baker Brothers, Inc., Toledo, Ohio

**A** YEAR before Pearl Harbor, the Food Machinery & Chemical Corporation, nation-wide manufacturer of machinery and chemicals, undertook its first major defense project. Working in conjunction with the United States Marine Corps, the company developed the now-famous amphibian "Water Buffalo" tank. By V-J Day, over 11,000 of these amphibian vehicles had been produced in the San Jose and Riverside, Calif., and Lakeland, Fla., plants of FMC.

Based on past experience, the company is today engaged in the production of armored infantry vehicles under an Army Ordnance contract administered by the San Francisco Ordnance Dis-

trict. This current production program, the largest defense production project of its kind on the West Coast, is under way at the corporation's new Ordnance Division production facilities constructed on a 90-acre tract in San Jose. Intricacies of machining the hulls of these armored infantry vehicles are explained in this article, the first of its kind to have been released by Army Security.

Many problems were faced in accurately machining the hulls from rough weldments that are 9 feet wide by 16 feet long, and weigh 20,000 pounds. In machining the holes in the bosses for the bogie arms, it is necessary to remove the least amount of stock possible, hold close limits, and

maintain good spacing between the bosses. After boring and facing the bosses, it is necessary also to drill and tap seven holes in each boss. An added operation is the drilling and tapping of the final drive pad, which meant another sixteen spindles at the appropriate positions. There are forty-seven holes on a side, each requiring three passes in addition to those needed for the five main bores.

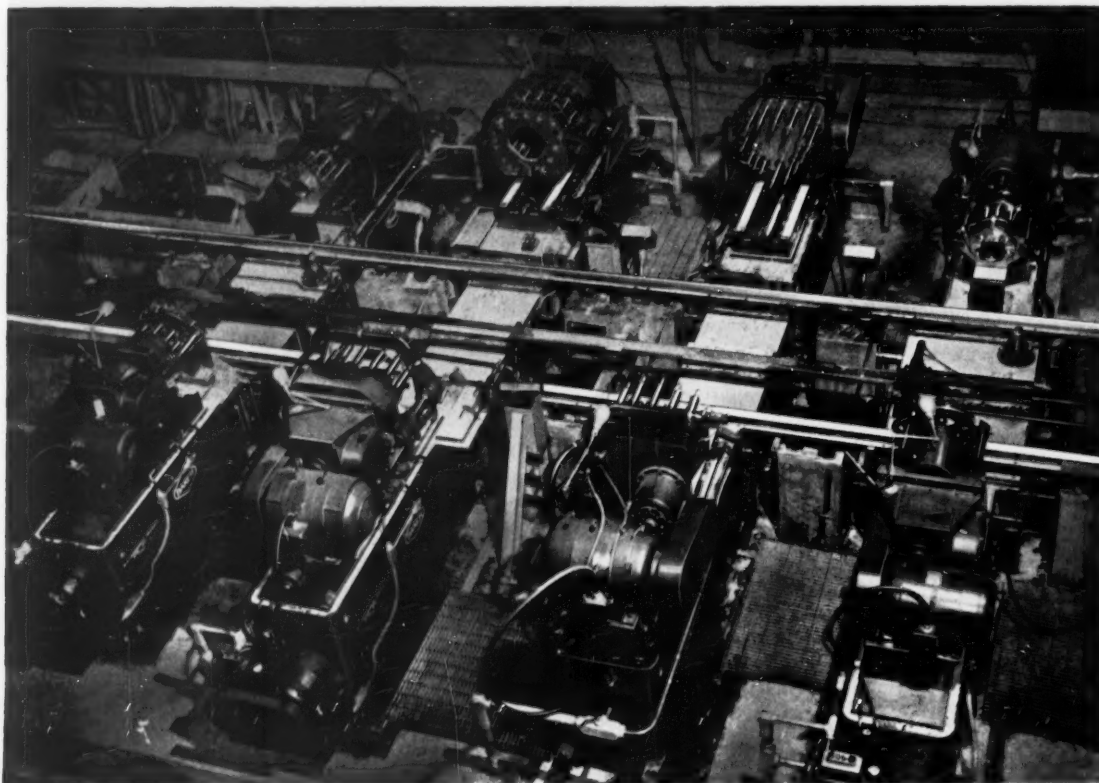
It was found that there would be great difficulty in positioning the hull in front of multiple-spindle units unless the bores and faces were machined while the hull was resting on a fixture that could be accurately transferred. Furthermore, alignment of the various machined holes from side to side would be insured by such a fixture transfer method. Combining operations at certain stations on such a machine would make it possible to drill all twelve holes in one pad while working on another.

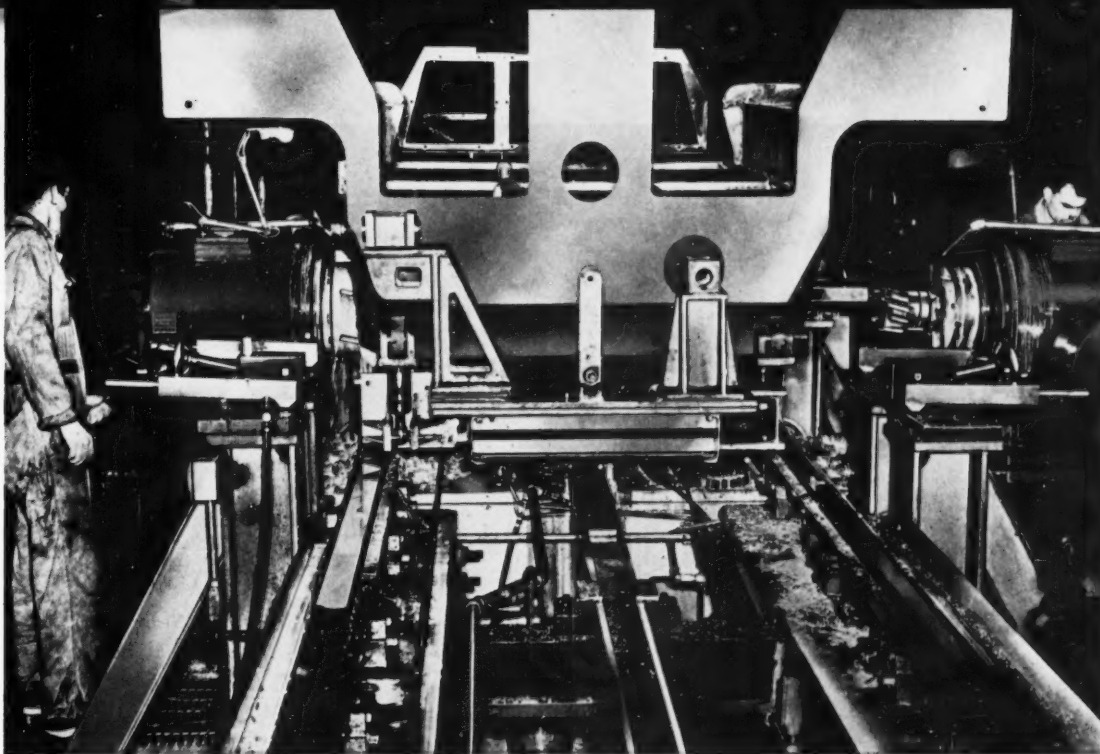
The alternative to this method would have been large boring mills and horizontal, single-spindle tapping units machining one hole at a time. To accomplish the desired results, Baker

Brothers constructed a huge transfer machine with accurate flat and V-tracks, supported in such a manner that they could be originally leveled and kept rigid by appropriate means. These tracks are visible extending the full length of the machine—a distance of approximately 100 feet—in the heading illustration. A specially built platen carriage runs on the track. This carriage is equipped with leveling and clamping devices to allow centering the stock of the hull.

When the hull has been loaded on the carriage and clamped, it does not leave the carriage again until all operations have been performed. The indexing of the carriage is automatic, employing a transfer bar and a variable-voltage, direct-current drive with rack. This type of index drive makes it possible to use a fairly high velocity on the heavy hulls, with good accuracy on an extreme index length of 228 inches. Due to the irregular spacing of the holes in the hull, it is necessary to index by varying amounts. Final positioning is obtained by a shot-pin accompanying the unit, and shot-pin bushings on the other side of the transfer carriage.

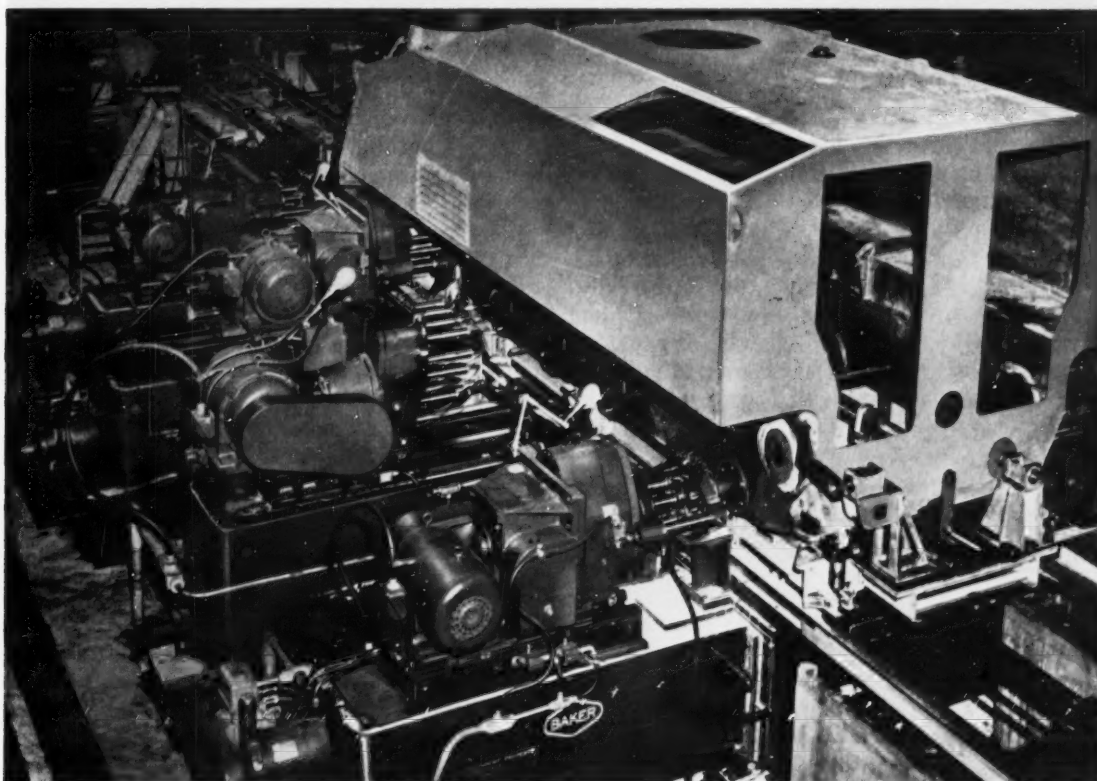
**Fig. 1. Opposing heads of transfer machine are built as a three-piece, two-way machine with end beds and a tying center bed.**



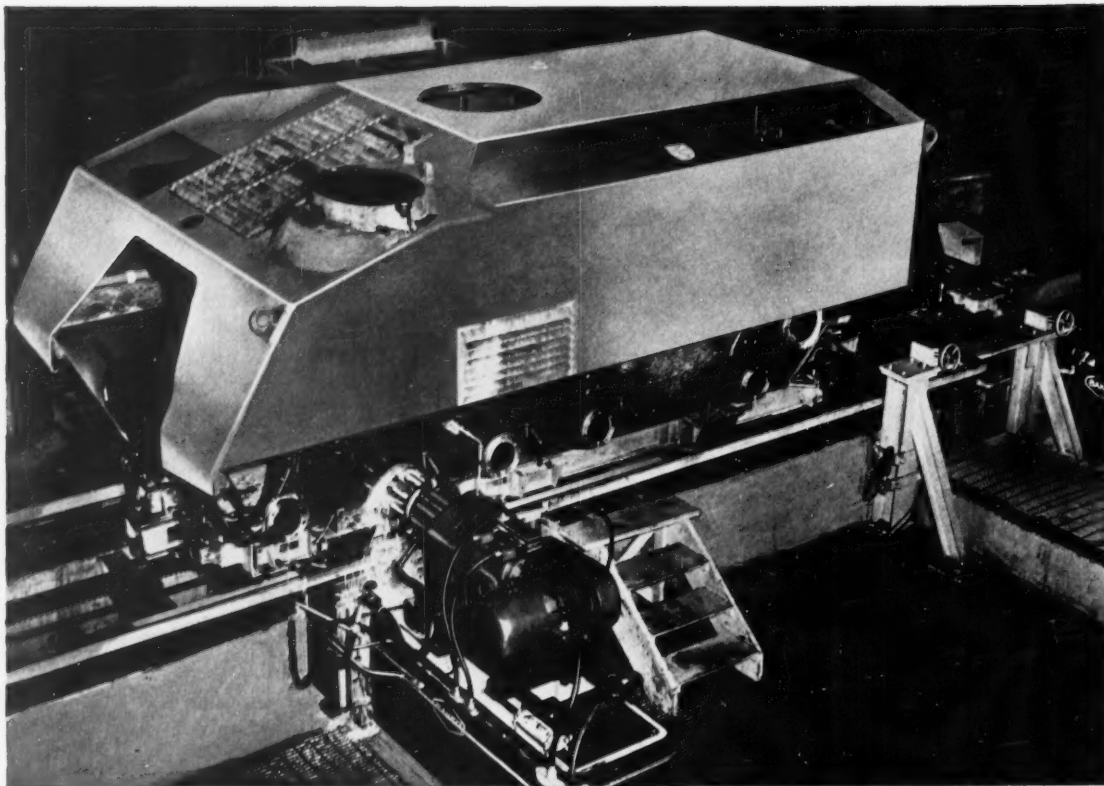


*Fig. 2. Hull of armored infantry vehicle and fixture on which it is transferred are supported from fixed members anchored in concrete.*

*Fig. 3 Both sixteen- and seven-spindle drill units of 100-foot long transfer machine are seen in operation on the armored vehicle hull.*







*Fig. 4 A seven-spindle unit is shown tapping holes in the fourth boss along one side of hull. After indexing, fifth boss is tapped.*

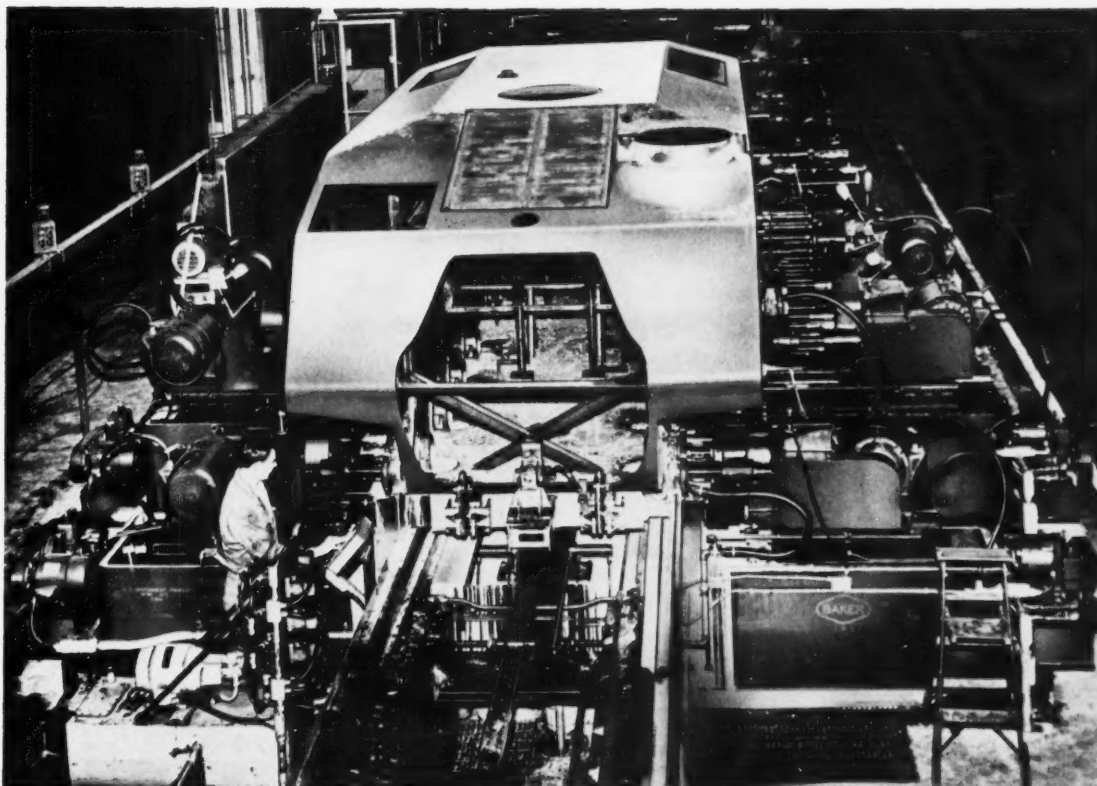
Reinforced concrete was used extensively in the installation of this machine. The whole machine rests on a soil condition that made it necessary to design a large floating slab strong enough within itself to support the machine and stay rigid. The track supports are cast as part of the slab, in the form of vertical walls. Extra depth was necessary in the slab since coolant wells had to be provided at all working stations to take care of the use of 640 gallons of coolant per minute. These wells were covered with gratings.

Standard way and bar type units are used throughout the machine, with each saddle equipped with its appropriate type of driving head and spindle. Boring is done with a special cutter mounted on a cone-worm drive head, and the drilling heads are multiple-spindle units mounted on standard drive boxes that contain change-gears. Bushing plates that register with the bores are used on all multiple heads. The tapping units, of individual lead-screw type, are advanced to the work on flat way slides. Hydraulic power for feeding and rapid traverse is supplied by Oilgear remote-controlled package units.

The same operations are performed on both sides of the hull simultaneously, but there is a small displacement from side to side which must be held. To provide for ease of manufacture, shipping, assembly, and erection of the machine, the two units opposite each other are built as a three-piece, two-way machine with center and end beds. The design aided in aligning the machine, and in keeping the necessary relationship from side to side. This type construction is clearly shown in Fig. 1, which is a view of the unit end beds and tying center bed, together with rails and transfer bar. Eight of the ten drilling and tapping units are seen in this illustration.

The transfer bar is connected and disconnected to the carriage by a pin and hydraulic cylinders. At the end of the 228-inch transfer distance, and before the bar returns, the pin is knocked out hydraulically. Cams on the transfer bar actuate limit switches during the transfer to give the various odd spacings required. The unit is slowed by the variable-voltage drive before the final position is reached, and exact location is secured by the shot-pin.





**Fig. 5 Operator and armored vehicle hull in position for the first drilling operation give some idea of over-all size of transfer machine.**

Electrical control is used throughout, with appropriate interlocking. Unit design was followed even in the electrical work, making possible additions or removals. An operator must start the unit and index cycles after certain appropriate clamping and unclamping have been done. For example, during the heavy cuts of facing and drilling, it is necessary to support the fixture and hull from fixed members anchored in the concrete. Handwheels for this purpose are seen at the left and right in Fig. 2.

A hull has been indexed into position, and the sixteen- and seven-spindle drill units are shown in operation in Fig. 3. Machining units are so spaced along the tracks that additional fixture carriages can be provided, and more than one hull can be worked on at the same time. This, of course, would greatly increase production if it became necessary.

The seven holes previously drilled in each of the five bosses along both sides of the hull are tapped simultaneously by means of a seven-spindle unit, with the hull being indexed after each operation to align the next boss with the tapping

spindles. In Fig. 4, the hull has been indexed and the fourth set of holes is being tapped.

Some idea of the size of the huge transfer machine can be obtained by a comparison of the man and the armored vehicle hull in Fig. 5. The first drilling operation on the last group of holes is being performed in this illustration.

Since the design and installation of the machine, two units not originally contemplated have been added to face and bore extra holes added on the hull. This is one demonstration of the flexibility of the transfer approach to machining a large unit. By putting the object on a fixture that can be transferred, and by making the units independent as two-way and one-way machines, operations can thus be added or deleted. Also, the machine described was recently retooled to accommodate a new design, the entire job being completed in somewhat less than four months.

Flexibility in ordnance, aircraft, or any armament design is highly desirable, of course, due to the ever-changing demands of our development engineers. This machine saved the taxpayer money and the hard-pressed military man time.

# Automatic Percussion Welding Speeds Contact Assembly

Multiple percussion welding of contact blocks to the ends of small wires is accomplished automatically in forming the stationary contact member of the Bell System's new wire spring relay

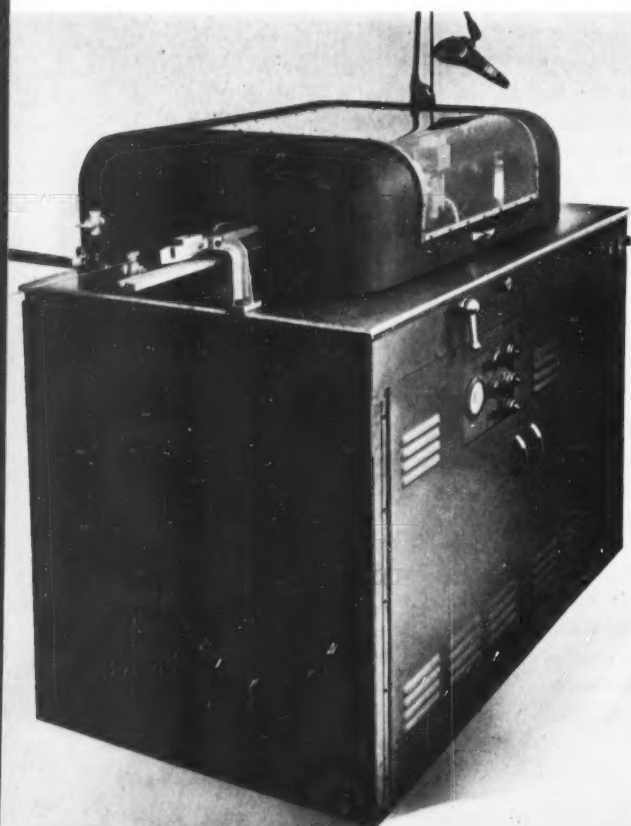
By A. L. QUINLAN, Development Engineer  
Western Electric Co., Inc., Chicago, Ill.

**P**ERCUSSION welding, although not basically new, has had surprisingly little application in industry. A good example of this method of welding is the Vang process wherein a capacitor charged to a high potential—often several thousand volts—is discharged across a gap between the parts as they are propelled toward each other. The arc that is produced heats the abutting surfaces before they collide so that a thin layer of metal is brought to a welding temperature. As the parts come together with an impact, the weld is made.

Only a small amount of metal is heated; therefore the heat balance problem is minimized and different metals weld together with little trouble. There is, however, the problem of protecting operators from the high voltage involved. Also, the two surfaces being welded must be insulated from each other, thus excluding the use of this process for joining the ends of the same piece of metal.

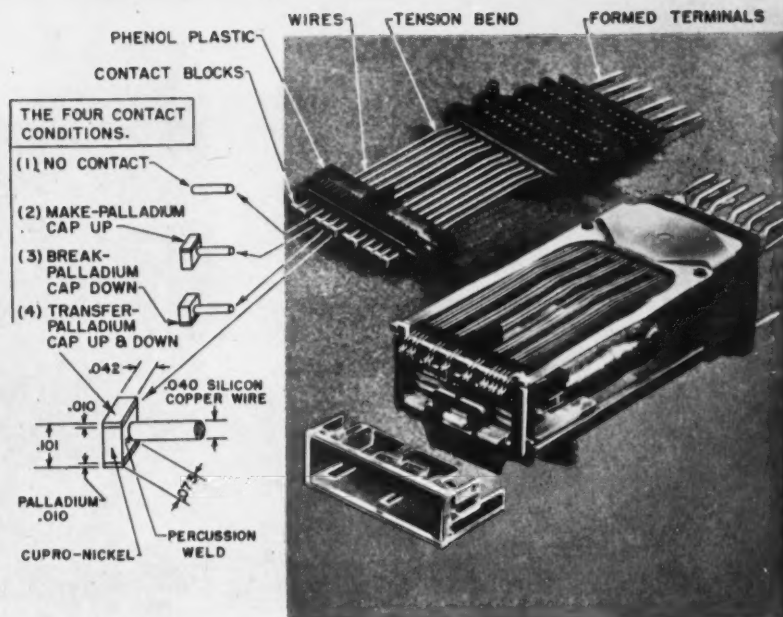
The decision to employ automatic processes in the manufacture of the new wire spring relay at the Chicago, Ill., plant of the Western Electric Co., Inc., posed unusual welding requirements. The design of one of the principal relay components necessitated butt-welding contact blocks to the ends of a group of small wires extending from a molded phenolic plastic block. This precluded employing clamp electrodes of the type normally used for resistance welding. Percussion welding solved the problem by making it possible to establish electrical contact with the wires beyond the plastic supports.

The machine illustrated in Fig. 1 was developed by Western Electric for the automatic percussion welding of contact blocks to the ends of the array of wires forming the "single wire comb" shown in Fig. 2. Small contact blocks are cut from a composite metal tape which is surfaced with palladium, a precious metal. There are several different combs to be welded, depending on the number and types of contacts required on the relays that receive each comb.



*Fig. 1. Small bimetal contacts are selected, cut to size, and percussion welded to wire ends in this automatic machine.*

**Fig. 2. Four types of contacts are shown, together with the single wire comb on which they will be welded, and the wire spring relay of which the comb is a part.**



Duplicate welding heads, which are mirror images of each other, are contained in the automatic welder, as shown in Fig. 3. The comb is held stationary while the contact blocks are held in jaws that move toward the wires on a carriage. This carriage mechanism is referred to as a "gun." Each gun may weld a contact every cycle on its own half of the comb, as illustrated. After each welding operation or cycle, the comb is indexed to the centers of the next pair of wires. Six cycles complete the welding of twelve contacts. The guns do not weld at the same time, there being an interval of 1 degree of revolution of the main shaft between the firing points to prevent electrical or mechanical interference.

One of the four contact conditions (seen at the left-hand side of Fig. 2) will apply for each wire. The contact may be required with the palladium cap either up or down, or both up and down; on some wires, no contact may be required at all. Three reels of tape are fed to each head. Adjustable knobs on both right- and left-hand tape-feed cams are set for one of the four tape-feed conditions for each wire position of the comb. Therefore, any combination of contact conditions can be set up to make combs for the various codes of relays.

The welding machine was designed to select the tape, cut the contact from it, and weld it to the wire all in one cycle, so as to avoid the handling problems associated with precutting and loading the contact blocks in magazines. The three tapes for each head enter the shearing die through individual openings. However, only that tape picked by the selector is fed into the die to be subsequently sheared.

As the contact is sheared, a notch in the punch supports the palladium sides of the contact to

prevent distortion. Then the punch delivers the contact to a transfer position at the end of the shearing stroke. There a transfer finger pushes the contact out of the punch notch, through a guide channel, and into the jaws of the gun.

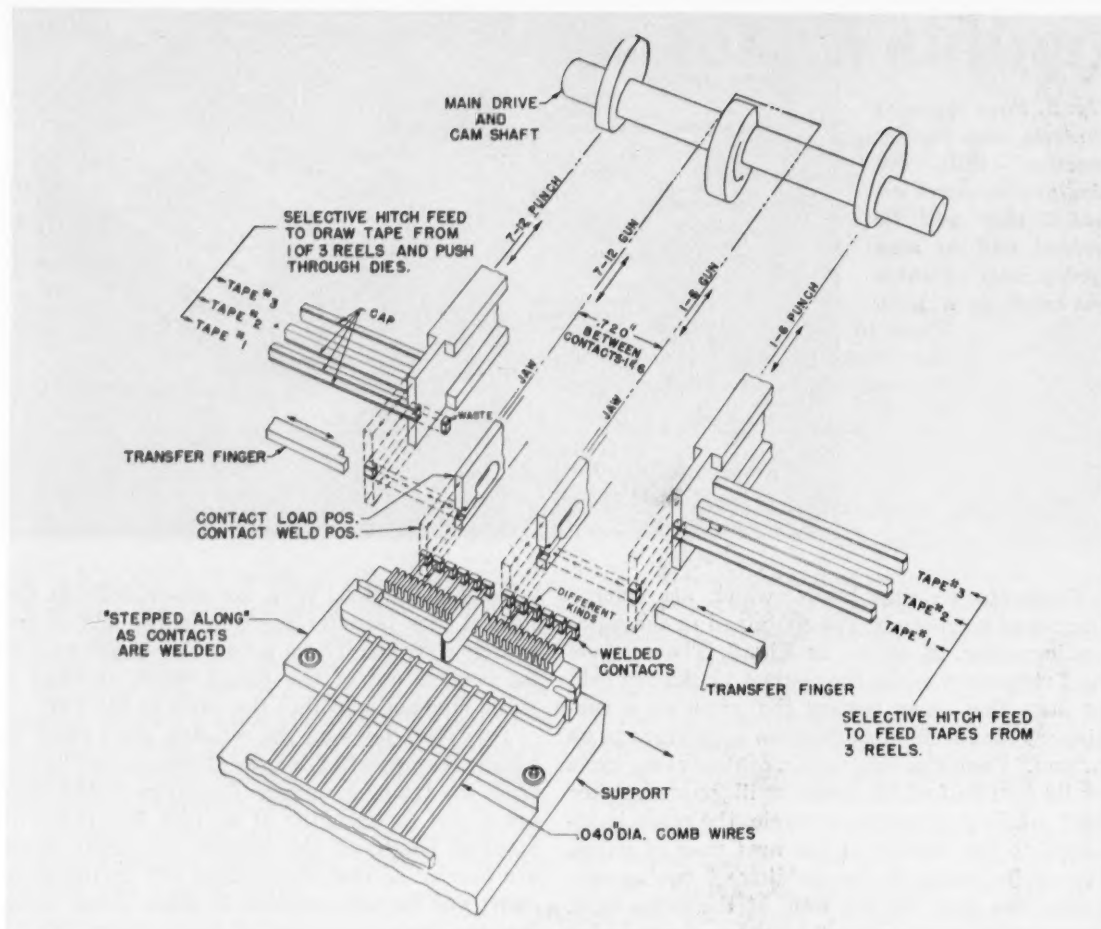
Two steel jaws on the welding gun (which is a light reciprocating member) receive the blocks from the transfer fingers. Openings in the jaws are a few thousandths of an inch less than the nominal height of the contact, but their edges are beveled so that the contact will spring them apart and be held securely in place. After welding, the jaws are pulled off the contacts. At the extreme return travel of the gun, any contact that might remain in the jaws due to improper welding is removed by an ejector blade.

A close-up view of the working members of the automatic percussion welding machine may be seen in Fig. 4. Cam A, which actuates the gun carriage, is situated between two cams B. These cams actuate punches C. Electric current is fed through a wire which connects with the gun carriage at D. The tape-feed mechanism is shown at E, while a nozzle, whose purpose it is to direct a stream of compressed air into the welding area, may be seen at F.

The gun weighs about 30 grams and is spring-actuated at a speed of approximately 40 inches per second. Gun velocity during the arcing period is an important factor in controlling the amount of heating.

Each weld circuit includes a capacitor which is charged during a small portion of each cycle and subsequently discharged through a resistance in series with the weld. During the charging period, the contact and the wire are separated at the weld point. A spring-loaded multiple-leaf brush connects the remote end of the individual





**Fig. 3. Simplified diagrammatic representation of the percussion welding mechanism showing the punches, gun jaws, tape positions, wire comb, and actuating cam.**

comb wire to one side of the circuit. The gun, together with the contact block, is connected to the other side of the circuit.

After the cam frees the gun, a spring propels it toward the wire end, and an electric arc is established by the high potential (900 to 1800 volts) just before the parts touch. The arc is initiated when the gap is reduced to a few thousandths of an inch. Normally, the abutting surfaces of both the wire and the contact block are melted to a depth of 0.005 to 0.010 inch, and expelled in liquid and gaseous states before the molten surfaces are forced together. The arc is extinguished when it can no longer melt and expel metal to maintain a gap. Under good operating conditions, it lasts from 0.1 to 0.4 millisecond. Nearly all the heated metal is expelled from the joint during the welding operation, as illustrated in Fig. 5. This photograph of a typical sectional percussion weld shows a layer only

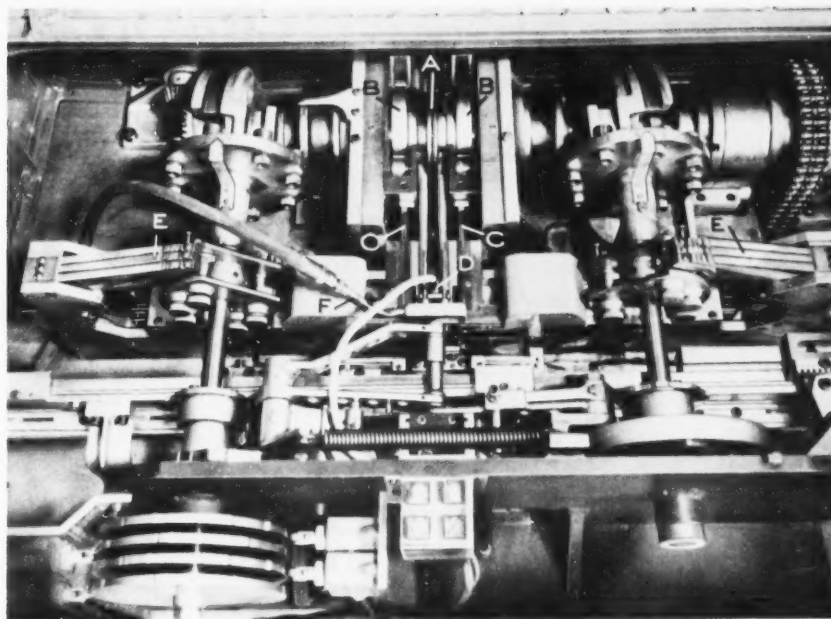
0.001 to 0.002 inch thick which was melted or heated sufficiently to change the structure.

A small jet of compressed air is directed into the weld area to prevent gaseous arc products from interfering with the initiation of the arc during the next weld cycle. Limited tests made with helium and nitrogen atmospheres gave no indication of improvement in weld quality.

In the development stage of the machine, an electrical timing device was used to measure the arc duration. Variations from 20 to 230 microseconds were observed. A correlation was found to exist between arcs of short duration—up to 65 micro-seconds—and the strength of the welds obtained. Although longer arc durations, in general, produced stronger welds, it was found that they tended to cause burning of the jaws. This was apparently due to relative movement between the contact and its jaw at the end of the weld cycle, resulting from vibration set up by impact



**Fig. 4. Close-up view of automatic percussion welder shown in Fig. 1. The actuating cams may be seen at (A) and (B,) and the punches at (C).**



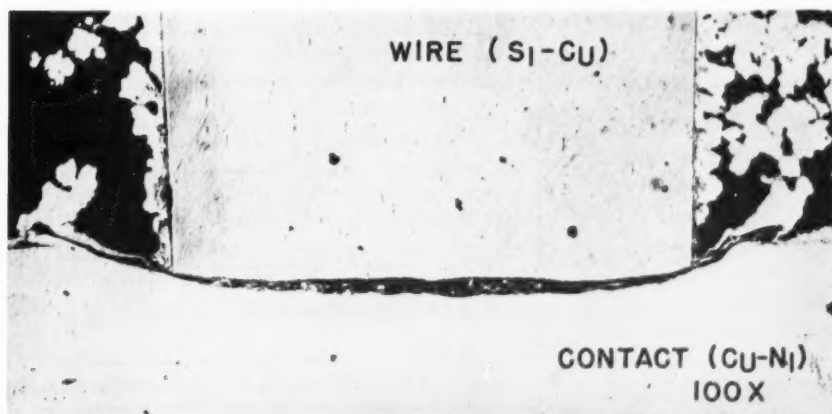
of the contact with the wire. The circuit presently employed is so well controlled that variation in the length of the comb wires after welding is negligible. This, of course, denotes good uniformity of arc duration from weld to weld.

The life of the gun jaws is dependent on many factors, one of which is the prevention of accidental arcing directly to them. Each set of jaws is adjusted so that, under normal conditions, it will not touch the wire and thereby discharge the capacitor if no contact is in the jaws. If, however, only a short length of contact tape is sheared off and placed in the jaws, it may start the arc, but due to insufficient material the arc may travel to the jaws, thereby burning them. Another troublesome condition is encountered when the wire end is misplaced so that it touches a jaw. To prevent resultant damage from this condition, a safety circuit is provided. Signal lamps are in-

stalled to indicate that the part is not completely nested or that a short contact is in the jaws.

Safety from high voltage is provided by door switches, solenoid-released "shorting" bars, and bleeder resistors on the capacitors. Protection from mechanical jams is provided by a slip clutch on the main drive-gear, and by a pull-out clutch and an automatic stop switch located in the work-piece transfer drive mechanism.

In conclusion, it is worth noting that the millions of welds made by this method have confirmed certain points. Accuracy of location and good weld strength can be obtained by automatic percussion welding. This method is especially useful where speed and precision are desired, and where joints must be made between dissimilar metals. Metals with high heat and electrical conductivity are particularly suitable for joining by percussion welding.



**Fig. 5. Typical section of a percussion weld showing the thin layer of metal that was heated sufficiently to cause a change in structure.**

# Why Do Abrasive Cut-Off Wheels Fail?

By E. J. DEWITT, President  
Wallace Supplies Mfg. Co., Chicago, Ill.

**C**UTTING bars and tubes to length by means of abrasive wheels is an established practice of many stock supply houses and machine shops. To take advantage of the rapidity inherent in the medium, proper use and care of the wheel are essential. Machine accuracy and work-holding methods, besides, have a direct bearing on wheel performance.

The most common cause of wheel breakage

may be attributed to excessive speed. Accordingly, it is wise to follow the instructions of the wheel manufacturer. The recommended speed is generally about 84 per cent of that at which the manufacturer is required to test his wheels. Centrifugal force increases rapidly above the test speed, so if the safety factor is violated, the wheel may disintegrate when it is forced against the work. The American Standards Association stipulates a surface speed range of 10,000 to 16,000 feet per minute for cut-off wheels of 16 inches or less, and 7500 to 14,000 feet per minute for wheels above 16 inches.

If abrasive wheels are used on saws designed for friction cutting with steel blades, the pulley combination must be changed to deliver the necessary lower speed. Likewise, the housing of an abrasive cut-off machine must never be altered to accommodate a larger wheel without reducing the speed of the wheel at the same time.

Shortened wheel life and breakage are also caused by spindles or mounting flanges that do not run true. Periodic inspection of these elements with a dial indicator is suggested.

The cut-off wheel operates at a speed substantially higher than do most other

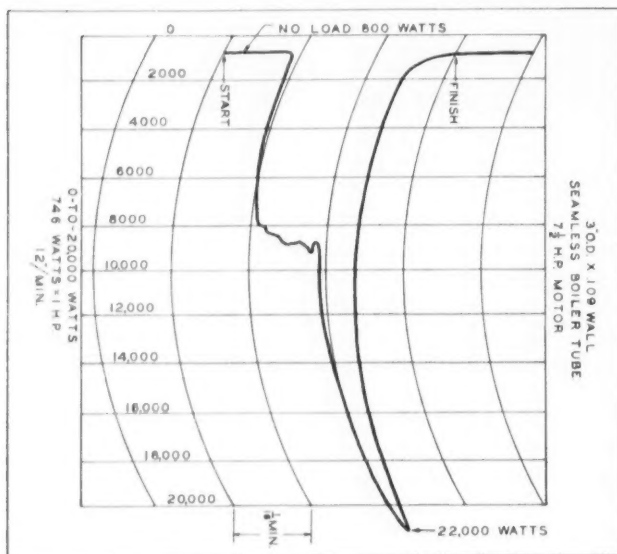


Fig. 1. (Above) A wattmeter reading of the cut-off cycle for 3-inch boiler tube shows a momentary overload of 22,000 watts drawn by the motor.

Fig. 2. (Right) Here, the reading shows the overload to which the motor is subjected to be 16,000 watts.

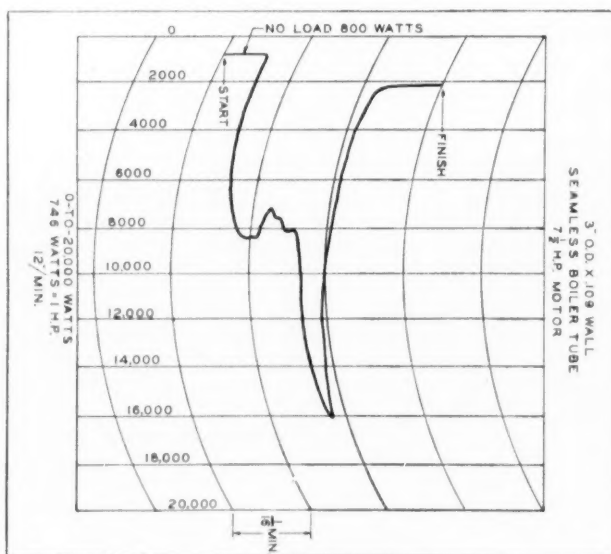


Fig. 3. An example of an unsatisfactory work-holding method—the severed length of stock has no support.

types of wheels or cutters. At the moment of contact with the work, the wheel transmits a severe shock to the spindle bearings. Before the bearings can recover from this shock, they are subjected to the repeated impact of the action of the infinite number of cutting teeth in the wheel. Very little wear will materially reduce the ability of the bearings to permit a smooth flow of power to the wheel. Under such conditions, it is inevitable that bearing replacements remain high. Frequently, wheel failure can be traced to spindle vibration created by worn bearings.

Few, if any, pieces of equipment found in the machine shop receive the abuse that the spindle and bearings of an abrasive cut-off machine do. Almost without exception, the cut-off machine spindle travels faster than any other final output shaft.

#### Motor Horsepower Requirements for Various Cut-Off Wheels

Wheel Diameter, Inches	Continuous Service, H.P.	Intermittent Service, H.P.
10	3	2
12	5	3
14	7 1/2	5
16	10	7 1/2
20	15	10

Wheel life can also be foreshortened by a surface speed that is too low. Poor cutting results, and the abnormal amount of friction produced softens the bond of the wheel. Consequently, abrasive particles that are still sharp are wasted.

The accepted cut-off practice is to move the wheel through the work as quickly as possible in order to realize optimum wheel life and produce the least amount of burring. Machine motors must, therefore, be of sufficient horsepower. In Figs. 1 and 2 are typical wattmeter readings of the power consumed in cutting 3-inch tubing of 0.109-inch wall thickness with a 16-inch wheel. The 7 1/2-H.P. motor momentarily draws up to 22,000 watts in one instance, and 16,000 watts in the other. The accompanying table gives minimum motor horsepower requirements for various wheel sizes for both continuous and intermittent service. Larger wheels have proportionately greater horsepower requirements. V-belts must be in serviceable condition,



and pulley size adequate so that there will be sufficient reserve strength to carry any overload in the cut-off cycle.

Second only to excessive speed as likely causes for wheel breakage are either the complete absence or the improper use of work-holding devices or clamps. Too often the device is only a piece of angle-iron on but one side of the wheel, as illustrated in Fig. 3. Leaving the unsupported part of the tubing free to roll away after it is severed causes a heavy burr to form at the exit of the cut. Also, during the cut the work can move sidewise. A movement of only 1/8 inch may easily mean a broken wheel; as little as 1/16 inch hastens wheel wear. And in the process of wearing out, poor cuts are produced.

It is of prime importance that the work be held so that it is fully supported on both sides of the wheel. In this respect, the V-block set-up in Fig. 4 and the pneumatic vise set-up in Fig. 5 are satisfactory. With the work so supported,

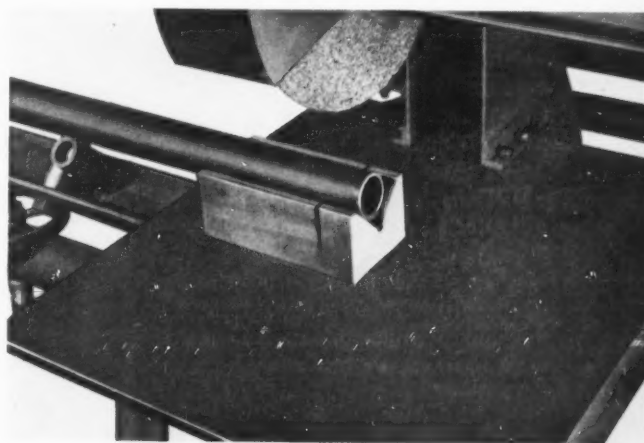
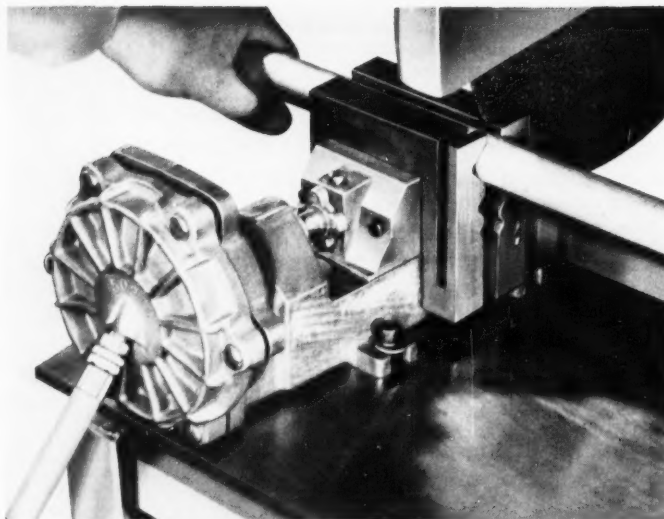


Fig. 4. The abrasive wheel enters the clearance slit in the V-block supporting the work.

Fig. 5. Special jaw liners are shaped to accommodate pipe of different sizes in this air-operated vise.



the burr is kept to a minimum. Where work of irregular shape is to be cut, special fixtures are necessary. A storage rack next to the wheel, as in Fig. 6, provides a convenient means of positioning the work in line with the wheel.

Because the wheels readily absorb moisture, they should be stored in a moderately cool, dry place. Moisture tends both to soften and swell the wheel, so that it loses its inherent hardness and its ability to produce a straight cut. If the swelling is considerable, there is also the danger that the wheel will fracture and fly apart in service.

Since the sawdust in which new wheels are shipped may collect moisture, the wheels should be unpacked and wiped off upon receipt. They

should be stacked flat on a substantial non-yielding surface. In securing a wheel to the machine spindle, the wrench used in tightening the end nut should not be pounded with a hammer. Otherwise, a cracked wheel might result.

Today, prospective users of abrasive cut-off machines have a wide field of good equipment from which to choose. There is greater economy, generally, in using a machine that will accommodate a wheel size larger than the one actually needed to cut the work at hand. Wheel life and price structure relative to more or less fixed costs tend to favor the larger diameters. The frequency of nonproductive wheel change-over time, for example, is less of a factor with a large wheel than with a small one.

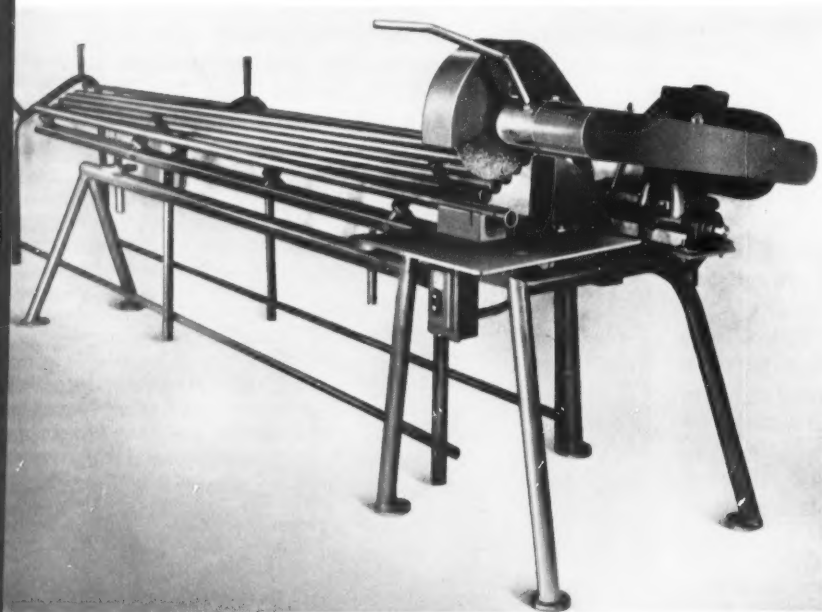


Fig. 6. A conveniently located storage rack saves time in the operation of the machine.



# A Sound Salvage Program Can Lower Your Costs

By P. A. JOCHUM  
Western Electric Co.  
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Fig. 1. Red brass castings are band-sawed from ends of scrap wave guides, made from commercial bronze.

**E**VERYTHING that is manufactured will one day find its way back to the scrap pile. In some instances, the item does not even reach the final manufacturing stage before the inspection department declares it defective and scraps it. In other cases, it may be in service one, ten, or a hundred years, but eventually it is discarded and becomes part of the world's most valuable mine—The Scrap Pile. This vast mine from which we and future generations will draw a substantial quantity of valuable raw material is in our custody, and it warrants an accounting from those in charge of salvage and reclamation. Each ton of scrap uncovered and sent to the mills contributes to the conservation of our national resources needed for defense and for a sound national economy.

Re-use of a large portion of non-ferrous scrap through conversion methods has the effect of lowering manufacturing costs and preserving vital raw materials. Whether your plant be large or small, the recovery realized from a sound salvage and reclamation program can often result in the difference between profit and loss in your business.

The key to the success of any plant salvage program is the appointment of a single individual with full responsibility and authority to do what is necessary to make the program effective. Objectives of the salvage program should be to see that all scrap and waste material found and produced is efficiently handled, to obtain maximum re-use and economic value from all such scrap, and to eliminate unnecessary scrap by intelligent observation of scrap sources and by close cooperation with production and design men.

The specific activities of a salvage department should thus embrace (1) the task—or at least the supervision of the task—of collecting scrap from the plant and removing it to a collecting room; (2) separation and segregation of much of the collected scrap, including the removal of iron from non-ferrous scrap with magnetic separators and the sorting of rejected parts by type of material; (3) temporary storage of all waste material after its removal from the production center; (4) preparation of the scrap for disposal; (5) transfer of prepared scrap to the shop for re-use if possible; (6) discovery of other

**Table 1. Numerical Index of Aluminum Scrap Classes**

GROUP 1—ALUMINUM	
<b>1.01 Aluminum Sheet, Rod, Wire, and Tubing</b>	Aluminum parts, sheet, rod, wire, and tubing free from all foreign materials. May contain up to 1 per cent oil or other non-metallic substances. (Indicate Grade 2-S, 3-S, etc.)
<b>1.02 Aluminum Turnings</b>	Aluminum turnings, chips, or borings free from foreign metals. May contain up to 1 per cent oil or other non-metallic substances. (Indicate Grade 2-S, 3-S, etc.)
<b>1.03 Aluminum Castings</b>	Aluminum castings containing not less than 90 per cent aluminum. Must be free from all foreign metal attachments or inserts.
<b>1.04 Aluminum Die-Castings</b>	Aluminum die-castings containing approximately 85 per cent aluminum and 15 per cent silicon. Must be free from all foreign metal attachments or inserts.

uses in the plant for waste materials; (7) determination of whether damaged or rejected parts or material can be repaired for re-use; (8) sale of the remaining scrap to outside organizations; (9) setting up of controls to assure management protection and security in the handling of all scrap material; and (10) arrangement for periodic audits covering all phases of the reclamation activities.

As a rule, the cost of operating a reclamation department is between 25 and 35 cents for every dollar's worth of material reclaimed. Therefore in order to make a profit, it is important to obtain the highest value for all scrap material processed and to do it as efficiently as possible.

A manual covering the complete operation of the reclaimed material department is recommended. The manual should deal with specific salvage problems, and be written from the viewpoint of the workman actually engaged in sorting, classifying, treating, and disposing of reclaimed material. It is advantageous to assign various materials to different numerical groups. For example, Group 1 might be assigned to aluminum scrap, 2 to brass, 3 to bronze, 4 to copper, 5 to iron and steel, and so on. Then, the numerical index of scrap classes can be further broken down, as illustrated for aluminum in Table 1.

One of the problems is to safeguard against scrap metal contamination. Machine operators should be instructed to clean their machines thoroughly before starting a new job using material different from the accumulation in the bed of the machine. It is generally profitable to put scrap material in individually marked, clean con-

tainers. Oily containers cause small particles of metal to adhere to the bottom and sides, which results in contaminating future scrap.

Raw material should be identified as soon as it is received, and retain this identification throughout the various stages of manufacture, or until delivery in the form of scrap to the reclamation department. In some instances, it is advantageous to segregate various metals by type, number, or grade, or in accordance with mill specifications, to insure receiving a higher value for the material than could be obtained if it were mixed and sold to a refinery.

As an example of the financial losses that might result from the mixing of scrap metals, we can assume that a machine operator failed to clean the bed of a screw machine and three jobs were run separately—the first part made from aluminum, the second brass, and the third iron. The scrap mixture from the three metals was analyzed and contained 63 per cent aluminum, 12 per cent iron, and 25 per cent brass. If the mixed turnings were sold "as is," the brass and iron content would be a total loss, and the price for the base metal (aluminum) would be reduced from \$8.50 to \$6.00 per 100 pounds (based on prices quoted early in March, 1954). Thus, the mixture would only be worth 63 per cent of \$6, or \$3.78 per 100 pounds.

However, if the scrap had been segregated by cleaning the machine after each job, and sold separately, the value received would have been \$10.52—a differential of \$6.74 per 100 pounds.

Design engineers are probably unaware that they too play an important part in metal contamination, and their interest should be directed toward designing products which will eliminate contamination of metals. Very often an engineer will design equipment such as an aluminum chassis and use brass, stainless steel, or iron accessories (rivets, terminals, brackets). Since the chassis is made of aluminum, why not stick with aluminum when its properties satisfactorily meet design requirements? By eliminating contamination at the designing stage, a higher value can be obtained for the scrap sold.

Another method sometimes employed to increase the value of scrap material is to burn the combustible portion of the scrap. For example, scrap items such as tube sockets, terminal strips, resistors, and fuse holders (made from plastic, rubber, wood, or fiber, and having non-ferrous inserts or attachments of low-content copper) can be burned and the ashes sold for their copper content. Otherwise, the freight charges for shipping the scrap items to a refinery "as is" would be prohibitive.

Also, insulation can be burned from heavy wire such as power cable and transformer wire, and

the wire sold for its copper content. However, light insulated wire, such as switchboard and hook-up wire, is baled and shipped to a dealer or refinery for processing.

Very often, scrap of different materials is produced on punch presses. If the punchings vary in diameter, it is possible to separate them with a vibrator, using different size screens. A vibrator is also useful to screen out dust and non-metallic parts from scrap metal.

Oil should be extracted from turnings or stampings before shipment is made to a mill. If this is not done, payment for freight charges are higher and metal recovery is lower. A simple method is to have the scrap placed in a funnel, with a sieve at the bottom which fits over a 55-gallon drum, and allow the oil to drain from the turnings or stampings. If the accumulation is large, a centrifuge should be installed to spin out the oil. Recovered oil can be re-used if properly treated. For the economical packing of bare and insulated wire, stampings, and large metal skeleton parts, a baling press is desirable.

A substantial increase in scrap value can often be realized by means of simple dismantling operations. For example, a scrap assembly containing 8 per cent brass, 28 per cent aluminum, 50 per cent copper, 10 per cent iron, and 4 per cent Bakelite would only be worth the copper content if sold "as is." By dismantling the assembly and selling the materials separately, twice the scrap value is realized.

However, the cost of dismantling should be carefully calculated before starting to separate the assembly. Sometimes the labor and factory burden costs make dismantling unprofitable. In other cases, partial dismantling might be more

economical. A band sawing machine is shown in Fig. 1 being employed to cut red brass castings from the ends of hollow, rectangular tube wave guides made from commercial bronze.

Where many materials are processed, a different basic color for each broad material group should be used, with another color to indicate the specific material in that group. It is advisable, however, not to depend on color markings alone to identify the many different grades of raw material or scrap. Tool steel numbers should be used either instead of, or in addition to, a color scheme for marking purposes. For this purpose, a table showing tool steel numbers, types, chemical composition, hardness, and color code is most helpful. Without question, the safest practice is to use a double marking system, such as color plus number or color plus name.

Spark testing is a commonly used method for identifying high-speed steel and other tungsten, chromium, nickel, molybdenum, cobalt, and vanadium alloy steels. The method is based upon the fact that some metals, in a finely divided state, will oxidize rapidly if heated in air to a high enough temperature. When such materials are ground by a high-speed grinding wheel, the fine particles torn loose are oxidized and raised to an incandescent temperature through the heat of friction on the wheel.

The spark test is best conducted on a high-speed power grinder with the specimen held so that the sparks fly off horizontally. A quick way to learn about spark testing is to obtain samples of metals (where the analysis is known) and become familiarized with the spark pattern.

Chemical spot testing may also be used for sorting or final identification of materials. It is

**Fig. 2. Chemical spot testing is helpful in determining whether transformer laminations contain silicon steel, iron alloys, or nickel.**



SCRAP IDENTIFICATION TICKET		SCRAP IDENTIFICATION TICKET	
LOT NO.	8696	LOT NO.	8696
SCRAP CLASSIFICATION NO.	101	SCRAP CLASSIFICATION NO.	101
DESCRIPTION	52 S AL Sheet Scrap	DESCRIPTION	52 S AL Sheet Scrap
GROSS WEIGHT	159 Pounds	GROSS WEIGHT	159 Pounds
DRUM WEIGHT	42 Pounds	DRUM WEIGHT	42 Pounds
NET WEIGHT	117 Pounds	NET WEIGHT	117 Pounds

Fig. 3. Identification tag placed on scrap material ready for shipment. Stub serves as inventory control.

important to remember that except under rigid laboratory control, spot tests are no more than qualitative tests. A quick way to identify nickel in iron alloy is to use copper sulphate by placing one or two drops on the cleaned metal surface. This method, shown being performed in Fig. 2, is helpful in determining if transformer laminations contain nickel, iron alloys, or silicon steel. Another method used especially for identifying tool steel alloys is a hardness test. Some of the methods used in Western Electric Co.'s reclamation department to identify unknown scrap material are listed in Table 2.

There are numerous specifications dealing with ferrous and non-ferrous metals that can be obtained from various sources:

1. Specifications for scrap metals, wastepaper, and textiles from the National Association of Waste Material Dealers, Inc., 425 W. 25th Street, New York City.

2. Iron and steel scrap specifications from the Institute of Scrap Iron and Steel, Inc., 1120 Connecticut Ave., N. W., Washington 6, D. C.

3. Rapid identification of nickel, chromium, molybdenum, stainless steel, vanadium, aluminum, brass, and bronze from the Development and Research Division, International Nickel Co., Inc., 67 Wall St., New York City.

An identification ticket that is placed on all scrap material after it is packed and ready for shipment is shown in Fig. 3. This tag consists of two parts containing identical serial numbers. The stub is forwarded to the clerical section where it serves as an inventory control, and also is used to originate a shipping ticket. When a serial number is shown on a shipping ticket, the shop has to produce the item that has the same serially numbered tag. Spot checks are made for correct classification and all material is reweighed at the time a shipment is made.

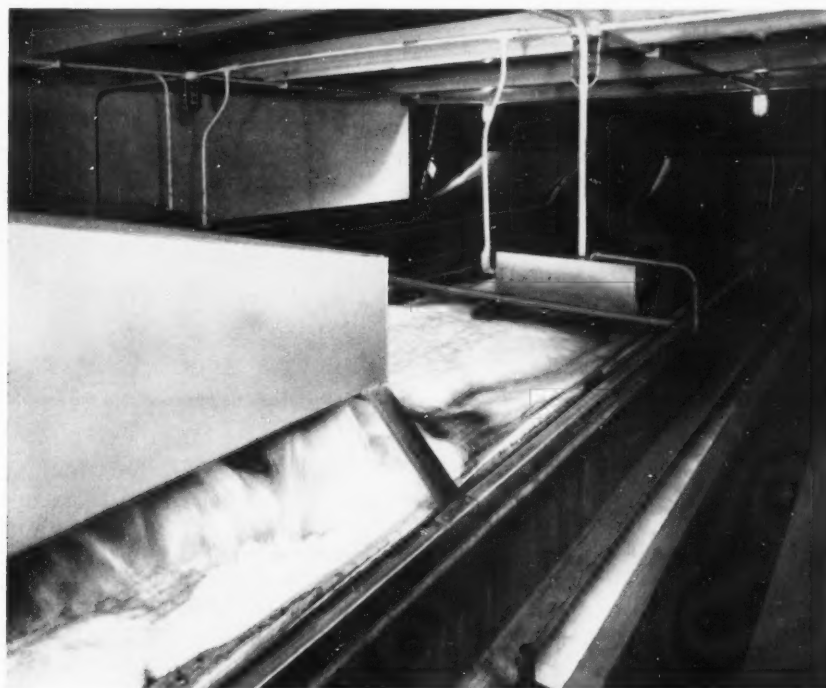
In disposing of scrap material, a knowledge of consumers and consumers' buying prices is essential. It is also beneficial to have a general knowledge of refining, handling, and transportation costs. With experience, a scrap salesman learns to relate these factors to the published markets for the refined raw material and thus predetermines fair selling prices. Sales of scrap material are usually made on a bid basis. A minimum of three bids is usually obtained; if the offers are too low, all bids are rejected.

Table 2. Methods Used to Identify Unknown Scrap Material

1. Check the scrap ticket for a clue to the identity of the material.
2. Select a sample and refer it to the shop where the scrap originated, and have the shop identify it.
3. Check the blueprint for identification and analysis of material.
4. Provide a sample board for employees in the reclamation department, and fasten skeleton parts thereon to check design against scrap material received.
5. Be on the lookout for trade names, type numbers, and grade stampings on scrap material.
6. Apply a magnet to determine if material is non-magnetic.
7. File scrap material to determine identity of non-ferrous metal or non-metallic parts.
8. Perform chemical spot tests.
9. Spark test tool steel on power grinder to determine if it is high-speed steel or other alloy.
10. Break castings to determine identity of white metal.
11. Very often the sense of smell will identify scrap materials such as hard rubber, Neoprene, or plastics.
12. Place filings of material or metal on a small piece of cardboard and apply a match. The identity of the material can sometimes be determined from the way it burns.
13. Scrap material can often be identified by its appearance and physical characteristics.
14. Listening to the sound when bending or cracking the material will help to identify it in some cases.



# Central Coolant System Serves Entire Grinding Department



**A** PATTERN of good housekeeping in the matter of handling coolant is being set at the New Philadelphia, Ohio, plant of the Warner & Swasey Co. In this modern manufacturing facility, a central coolant system serves the three bays of its grinding department. The thirty-odd machines already at work in the department produce a variety of parts for the machine tools, textile machines, and earth-moving equipment made by the company. All types of grinders are included—surface, cylindrical, centerless, internal, spline, and special.

Coolant is pumped to the machines in the bays from a huge filtering station installed in a pit at one end of the department. Each of the two Delpark filtering units in the pit, appearing in the heading illustration, has a tank of 2100-gallon capacity. Coolant draining from the grinding machines flows in trenches to the pit, where it is filtered and recirculated. The returning coolant flows through a diffuser and onto a special disposable filter paper that traps the grinding swarf. This paper is obtained in the form of large rolls that are suspended at one end of the units. A continuous mesh conveyor over each tank supports the paper as it is unrolled.

When the swarf settling on the paper builds up to a density (about 1/8 inch) that no longer permits the coolant to filter through to the tank, a "lake" is formed on top of the paper. After the lake rises to a certain height, a float type switch is automatically actuated, energizing the conveyor motor. The conveyor then advances slowly toward the far end of the unit, with the weight of the accumulated swarf causing the paper to cling to the mesh. Soon, the level of the lake drops as the coolant is once more able to filter through fresh paper, and the conveyor automatically stops. When the swarf again builds up, the cycle is repeated.

Used paper falls into a container located at the end of the machine. Periodically, a crane will move over the pit to empty the container. When a roll is nearly consumed, a warning light is automatically turned on.

To recirculate the coolant, each unit is equipped with a Carter 400-gallon pump. There is also a third stand-by pump of similar capacity. The trenches, of which there are two, separate the three grinding bays, and all machines are aligned near the trenches, as can be seen in Fig. 1. Some of the deck plates in the foreground have been

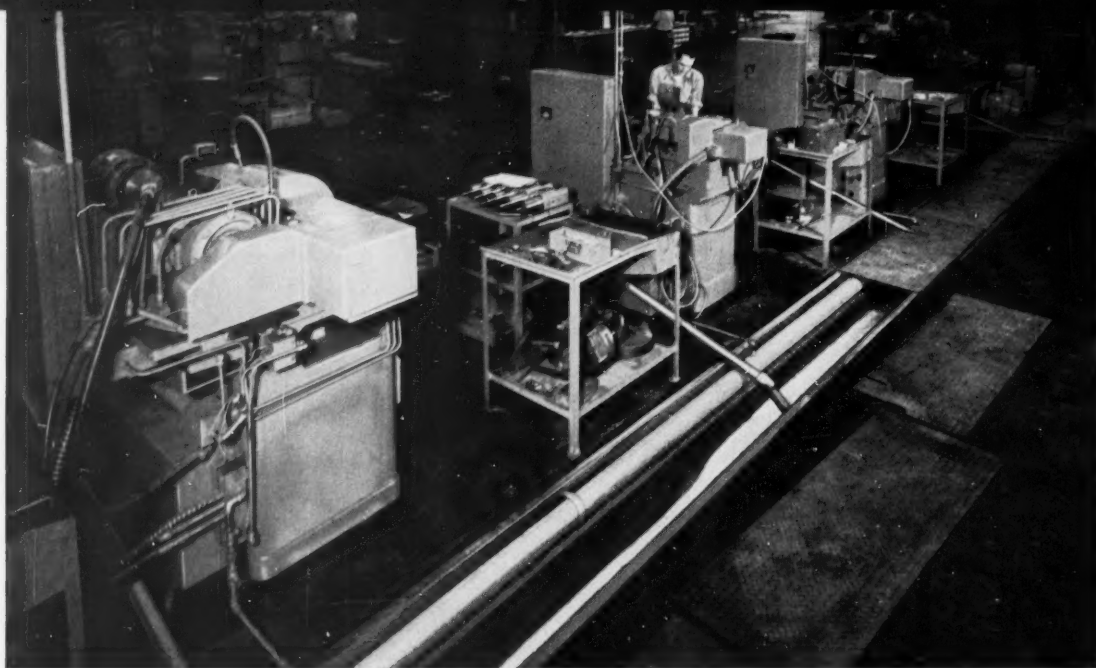


Fig. 1. The 4-inch header carrying the cleaned coolant is compactly arranged within the trench.

removed to show the adjacent trench. Each trench is 165 feet long and has a pitch of 1/4 inch per foot. The return pipes from the machines extending into the trenches slope toward the pit to eliminate any turbulence.

The coolant being recirculated flows through 4-inch headers supported on a ledge in the trench. Working pressure of 25 pounds per square inch is maintained by relief valves at the ends of the headers. The flushing action of the by-passed

coolant prevents any build-up of swarf in the trenches.

The piping at the rear of a Cincinnati grinder can be seen in Fig. 2. In the arrangement, the return *A* and the feeder *B* are in the area normally occupied by a separate tank and pump for the machine. In addition to the flexible line *C* leading to the grinding wheel, the feeder has a branch *D* consisting of a small plastic hose, at the end of which is a trigger-controlled nozzle.

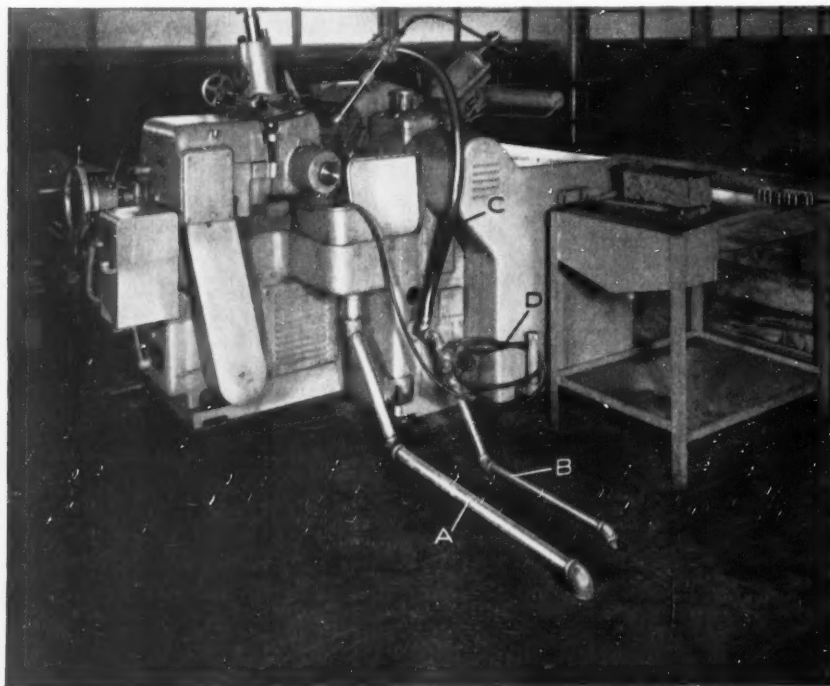


Fig. 2. With no sump pump and tank in area around the machine, extra floor space is available.



Fig. 3. The central coolant system gives this bay an air of orderliness.

Operators use this hose to clean the machine, avoiding the questionable practice of employing a jet of air for this purpose.

The central coolant system in the plant has proved advantageous in many respects. Because of evaporation, the coolant must be occasionally replenished. Since it can be mixed in batches and maintained at the same consistency for all machines, considerable time is saved. Also only one worker is required for mixing and maintenance, a job consuming only a half hour daily.

The long grinding wheel life experienced on the various machines—25 per cent above the estimated average—can be directly attributed to the system, since the high degree of cleanliness of the coolant prevents the wheel from becoming loaded, consequently increasing the length of the intervals between wheel dressings. Because of its large volume, the coolant is delivered to the machines at a constant temperature—a factor of great help in maintaining size and quality.

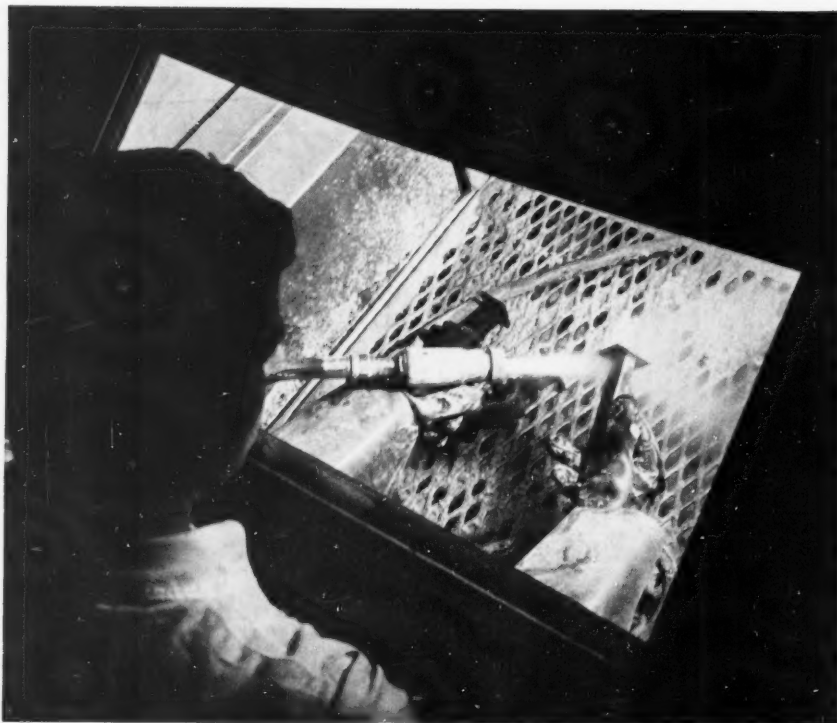
Probably the greatest advantage is the ability to use coolant indefinitely. (Machines doing similar work in other plants require complete coolant replacement on a one- or two-week schedule.) Not only is there a tremendous saving in the cost of coolant, but machine efficiency is increased by the absence of the "down" time and labor needed when an individual machine tank is drained, cleaned, and refilled.

To date, the coolant has shown no tendency toward rancidity, nor have there been any complaints from operators about dermatitis. What is more, as can be seen in Fig. 3, the absence of a tank and pump at each machine gives the department extra floor space and orderliness.

### Powdered Metal Electrodes Improve Welding

Electrodes with large quantities of powdered metal in their coatings make possible increases in welding speeds, with bead smoothness and freedom from spatter almost equal to that obtained with automatic welding. According to the Lincoln Electric Co., which introduced these electrodes, substantial cost reductions have already been realized.

The arc drawn from the ordinary electrode melts the core wire, the electrode coating, and the immediate weld area of the parent metal. An increase in welding current increases the speed with which the arc can perform these functions. But too much current may overheat the electrode and destroy the coating; or it may produce excessive penetration, gouging, or too much spatter. Electrodes with powdered metal raise the top limit on welding speeds by eliminating or lessening these difficulties. They do this by using the excess heat available in the arc to melt the powdered metal in the coating. This additional source of filler material permits higher welding speed. An increase of 50 per cent in speed can be effected where powder in the electrode accounts for one-third of the amount of the deposit. Proper balance is necessary between powder and core wire. If there is too much powder in the coating, so much of the heat of the arc may be absorbed by melting the coating that there will not be enough heat to melt the parent metal and core wire. Electrodes with powdered metal coatings raise the welding speed limit imposed by the current carrying capacity of the core wire.



## Radar Parts are Cleaned by Wet Blasting

**W**ET blasting is now a recognized cleaning medium at the Sperry Gyroscope Co., Great Neck, N. Y. Used to prepare intricate microwave sub-assemblies for electroplating, the blast rapidly cleans and roughens the surfaces of the parts without destroying tolerances.

The sub-assemblies are used extensively in radar systems. They consist of rectangular extrusions of brass tubing that connect flanges of cast phosphor-bronze. Some sub-assemblies also contain other castings, such as housings. After the flanges undergo a series of milling, drilling, and broaching operations, they are brazed to the ends of the tubing. Current is carried through the surface of the metal, tubing of different cross-section transmitting different wave lengths.

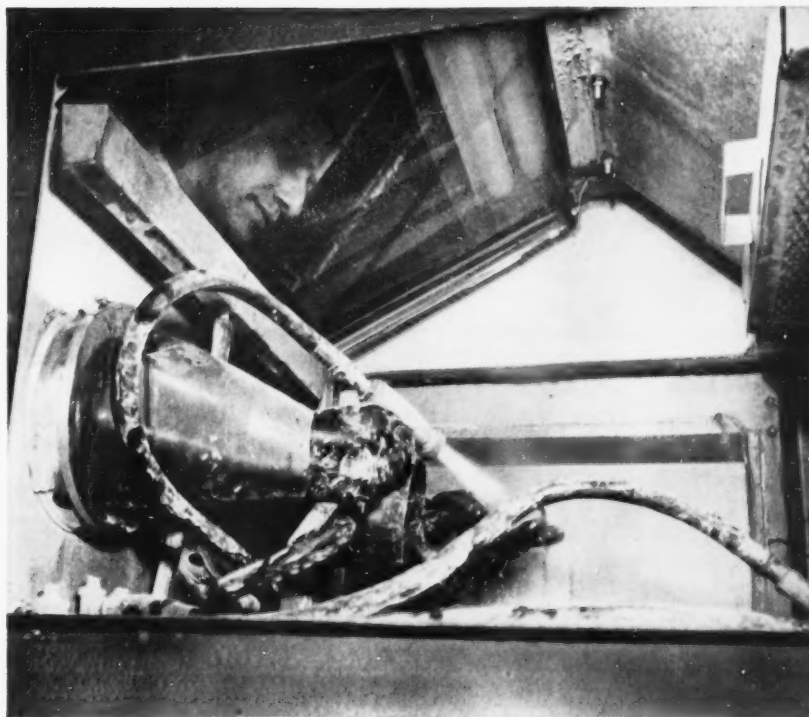
Later, as sub-assemblies, the tubing and flanges receive three additional platings to further increase conductivity and prevent corrosion—first copper, then silver, and finally, palladium

Fig. 1. Knee-actuated control of cleaning medium and air supply leaves the operator's hands free to manipulate the spray gun and work.





Fig. 2. To resist abrasion, the nozzle of the spray gun is made of carborundum. Blasting time varies according to the extent of oxidation of the work.



or rhodium. Proper plating requires a thoroughly cleaned and slightly roughened surface.

Sand blasting, which was tried in the past, had to be discontinued since, even with fine grit, the abrasive quality of this medium was incompatible with the close limits on dimensions and surface flatness already established. Hand dipping in an acid bath and then wire brushing also proved unsatisfactory: it was time-consuming, and no known solution could clean both the tubing and the castings without oxidizing one or the other, because of the dissimilarity of the metals. On the other hand, the wet blasting process now being used has none of these deficiencies.

The heading illustration is a close-up view of the operator at the window of the wet blasting cabinet. This is a Cro-Plate "Pressure-Blast" unit. The sub-assemblies being cleaned are for primary power measuring devices known as microwave attenuators. Built-in rubber gloves enable the operator to grasp the part in one hand and direct a spray gun with the other. The cleaning agent consists of water in which a fine grit (Novaculite 325) is suspended.

The whole cabinet is shown in Fig. 1. By means of knee-actuated controls, the operator opens and closes the spray gun, and "washes" the completed work with a jet of air. The inside

of the window can be cleaned by a stream of clear water from a valve on the cabinet. Work is loaded and removed through a side door. A view through this door is shown in Fig. 2.

The unit is equipped with both a low-pressure gun and a high-pressure gun, but the low-pressure gun (operating at 60 to 75 pounds per square inch) is used exclusively on microwave elements. Grit concentration is from 35 to 40 pounds per 20 gallons of water. The mixture gives about sixty hours of service, after which the grit begins to break down.

Surfaces of three attenuator sub-assemblies are compared in Fig. 3. At the left is a brazed assembly before cleaning. The middle one has been cleaned by dipping and brushing. Shown at the right is one cleaned by wet blasting.

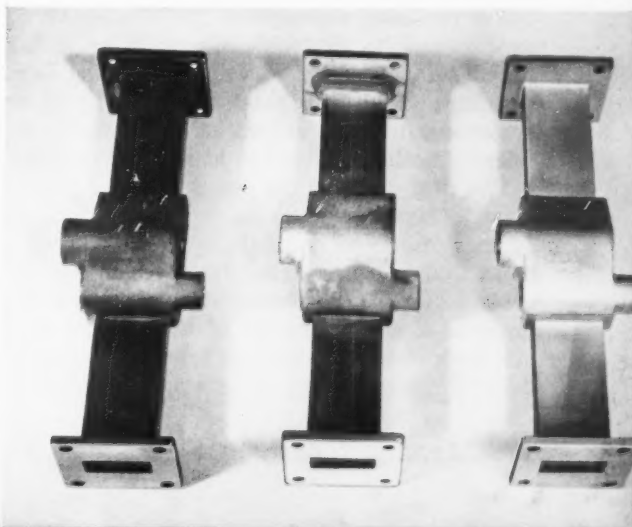


Fig. 3. Comparison of surface texture of a sub-assembly as brazed (left), after cleaning by dipping (center), and after cleaning by wet blasting (right)

# Dimensions and Tolerances for Mass Production

## Summary—I

**In this twelfth of a series of articles on dimensions and tolerances for mass production, the author recapitulates the various steps that are necessary to make the dimensional information on detail drawings precise and complete**

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### ***Dimensional Information Requirements***

The dimensional information that is placed on the detail drawing must be precise and complete. It must be adequate to insure that the gages and all other manufacturing equipment, designed directly from the information on the detail drawing, can be built without reference to any other source of dimensional information. (It is assumed that the tabulated values for any standard feature that has been called for on the detail drawing are an integral part of this drawing.) In addition, the gages and other special manufacturing equipment, when properly designed from the information on the detail drawing, must insure that the components themselves will assemble and function correctly in the assembled product.

### ***Responsibility for Dimensional Information—***

It is the responsibility of the engineering department, in collaboration with the production, inspection, and service departments, to initially establish limits or tolerances that should be adequate for both the correct functioning of the product and be attainable in production. Established standards of fits, values from the detail drawings of earlier models, and continued experience with the problems of dimensioning and tolerances all contribute to attaining this end.

The first draft of the detail drawing will always be inadequate to some extent. It is the further responsibility of the engineering department that when the need for revision becomes evident because of information gained by actual production and operation of the specific product, such changes are made promptly so that a definite record of such experiences is made.

**Basis for Establishing Tolerances—**There are no rules or formulas for establishing the extent of the tolerances for all phases of engineering, but there are certain principles for the application of tolerances to the several conditions which must be controlled by the use of tolerances or limits. The amount of tolerance to select initially will always require judgment. After production is under way, more definite information becomes available as a deliberate and continued search is made for it. The design must therefore be analyzed carefully to determine the degree of accuracy that is needed to meet the functional requirements of each detail part, while the processes for its manufacture must be selected so that they can maintain the required degree of accuracy.

The greater the permissible limit of tolerances, the less costly the part is to produce because of reduced material scrap, lower labor costs, and less expensive tools. In certain cases it may be advisable to use closer tolerances than required for functioning to facilitate inspection or to control the position of the part in the course of manufacture. The necessity for this should be determined by ascertaining where the greater saving lies—by closer tolerances and shorter assembly or set-up time, or by greater tolerances and longer assembly or set-up time.

Investigation of current production practices is essential as a guide in setting further limits and tolerances because in most cases they represent practical and successful manufacturing methods. This also entails the frequent revision of detail drawings for current production to keep them up to date with current production achievements.

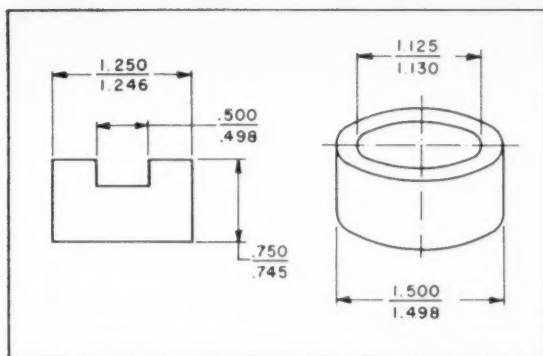


Fig. 1. Where both the maximum and minimum limit sizes are indicated in the manner here shown, the maximum metal limit size is placed above the line in all cases.

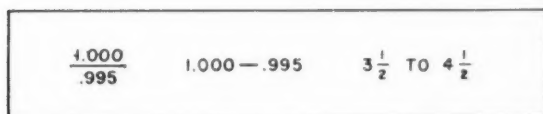


Fig. 2. When limits are expressed in drawing notes, they may be written in any of the forms shown.

### Use of Standards

Little or no mention has been made of the pertinent and available standards that apply directly to the problem of production design, such as standard systems of fits. For one reason, the standards or manuals of design will never be so complete that the dimensions and tolerances for every feature of the component can be selected from a table without careful analysis of the particular functional conditions involved in the case at hand. In all cases, the effective operation of the product and the convenience and economy of manufacture are the primary considerations. If any standard feature meets these conditions, it should always be used in preference to any other construction. If it does not, it should never be used.

Once the sizes and tolerances for any pair of mating features have been tentatively established, they should be compared with a table of standard fits. If a combination is found in such a table that is close to the tentative values selected, the standard values should be used. If there is nothing in the standard tables that appears to fit the particular need, the values in the table are ignored. In either event, if in the course of manufacturing experience the need for revisions is clear, these must be made whether or not they agree with any standard.

Again, in the early part of the production design, the clearance conditions needed for effective operation of the product may be uncertain. Here,

tentative values taken from the table of a standard system of fits can be used. Their effectiveness must later be checked by their performance in the manufacturing models. If they prove satisfactory, they are used. If not, then the necessary revisions must be made regardless of the standard values.

The same attitude should be taken toward all dimensional engineering standards. A standard is developed to meet the needs of average or normal conditions. These are in the majority. Unusual cases always require special consideration. In the final analysis, regardless of who the sponsors are for any particular standard, the standard itself must stand or fall on its own intrinsic merits. The more prominent the sponsor, the sooner and wider its trial will be. If it adequately meets the needs of the majority of its applications, it will be widely used. If it fails to meet these conditions, it will soon be abandoned regardless of the amount of publicity it receives. A truly effective dimensional standard does not need the backing of any organized group to be widely accepted and used, although such backing is helpful in gaining initial consideration throughout industry. Many of the dimensional standards of today started from the original suggestions and contributions of individuals.

### Use of Datums

The economy of manufacture and the increase in the over-all accuracy of many constructions can be greatly improved by the use of specified datums for positioning purposes. The examples in the text refer, primarily, to machined products, although the underlying principles are applicable to other types as well. Take, for example, any part or fabricated detail made of hot-rolled steel which is assembled from several units welded together. Each unit of the assembly may have flat or curved surfaces. In either case, three fixed points on its surface will definitely locate it in space. For such a unit, three convenient points on its surface should be selected and speci-

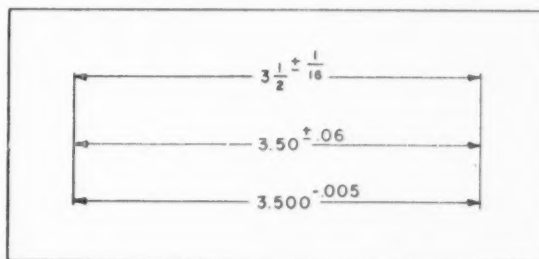


Fig. 3. Unilateral tolerances are expressed by a single value following the dimension; bilateral tolerances by plus and minus values following the dimension.

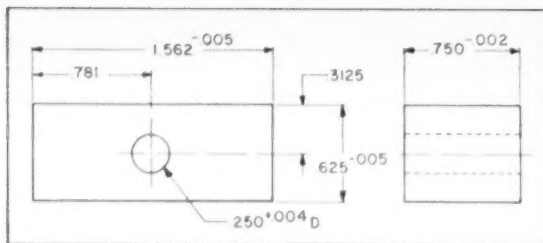


Fig. 4. As here shown, dimensions should be arranged to give required sizes and distances directly without the need for additional calculation.

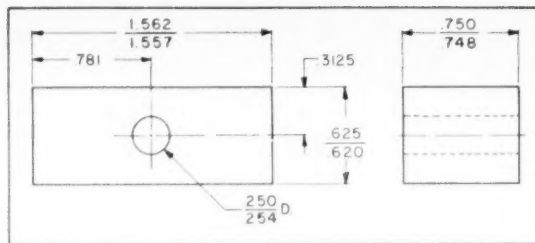


Fig. 5. The limiting dimensions shown in Fig. 4 can also be expressed as indicated here. The dimension lines should not pass through dimension figures.

fied as datums. These datums can be marked by a prick-punch, spotted with a drill point, or identified by a spot of paint. These datums are, then, the fixed locating points for all subsequent operations.

The edges of the unit parts may be produced by flame-cutting, shearing, or other processes. The unit may need to be supported and clamped at other points near the edge for some of the operations. The actual positioning, however, is always controlled from the same three selected datums.

When the units are completed, they are then assembled in a welding jig. They are located in these jigs from the selected datums. Small wedges are driven in the seams between the units to hold them in their correct positions in the jig. The welder then tacks the units together by welding them at strategic places. Then the wedges are removed and the entire seam is welded.

This practice permits very liberal tolerances on all the surfaces of the individual units and as high a degree of accuracy for the welded features of the assembly as may be built into the welding jig. The datums are identified on the detail drawing of the individual unit by the datum symbol—a short vertical line with small circles at either end of it. The positions of these datums are indicated by constructional dimensions on the detail drawings.

### Selection and Expression of Dimensions and Tolerances

The proper selection of the dimensions and the application of limits or tolerances to those dimensions that need them are most important. Since the art of manufacturing in its present state of development cannot produce identical parts, tolerances are necessary evils and every effort should be made to reduce their troublesome defects to a minimum.

**Types of Dimensions**—There are three kinds of dimensions that are used on detail drawings. These are as follows:

**Constructional Dimensions**—These may be needed to define the outline of a casting or forging, the profile of some composite form, the locations of holes, and many other similar conditions. Tolerances are never given directly on constructional dimensions. If the constructional nature of any such dimension is not clearly evident, it should be followed by the letters: *CONS.*

**Calculated Dimensions**—These may be needed to record the dimensions of some initial starting point or for the use of the tool or gage designers. Tolerances are never given on any calculated dimension. In every case they will be followed by the letters: *CALC.*

**Limiting Dimensions**—These are needed to define the limits of variation of many machined

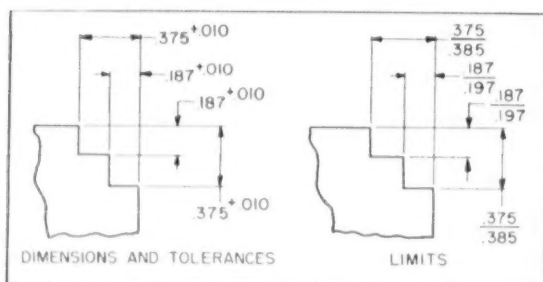
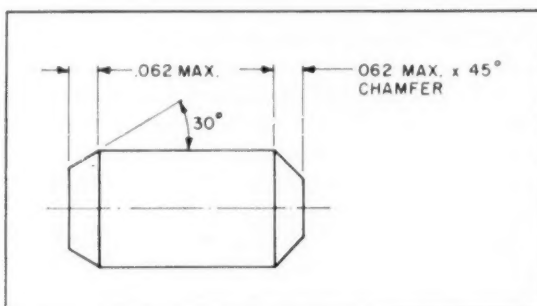


Fig. 6. Crossing of witness lines should be avoided whenever possible. If crossing is necessary, however, the witness lines should, as illustrated, not be broken at the point of intersection.

Fig. 7. (Below) Chamfers should be dimensioned, rather than covered by a note, wherever possible.





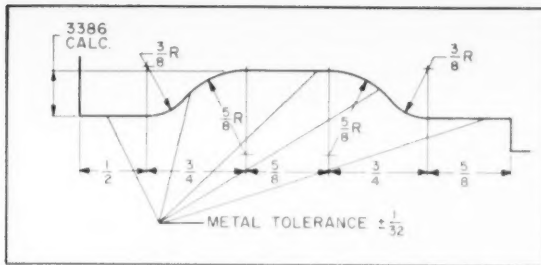


Fig. 8. Since contours of this type are generally inspected with a contour gage, the dimensions specified are given as constructional dimensions without tolerances. In such cases, a metal tolerance is specified for the contour.

surfaces that must fit or clear other surfaces. These limiting dimensions define the extreme limits of the inspection gages and inspection procedure. In all cases, they are translated into definite inspection gages. Once the gages have been accepted for production control, the conditions permitted by the gages supersede the strict geometrical requirements of the detail drawing and its dimensions. Limiting dimensions or limits may also be defined as specified maximum and minimum sizes.

**Need for Limiting Dimensions**—Limiting dimensions are needed to meet different conditions, namely: conditions of size or bulk, conditions of form, conditions of position, and conditions of operation or functioning. The methods of expressing the limiting dimensions or tolerances for different conditions vary. There is no single practice that is adequate for all conditions.

The main requirement is that the limiting conditions must be so expressed that there is no ambiguity and also in such a manner that the limiting conditions of the inspection gages are definitely established. This requires the arbitrary translation of the dimensional specifications either into specific inspection gages or into inspection procedures.

**Expression of Limits**—Limits are expressed in decimals showing the maximum and minimum metal limit sizes, as seen in Fig. 1. The decimal portion of both limits contains the same number of digits. Limits on vertical dimensions are written horizontally and are separated by a line. The maximum metal limit size is placed above the line in all cases. When limits are expressed in notes, they may be written in any of the forms shown in Fig. 2. The *design size* is the exact size of any feature of a component from which all variations are specified. It is also the desired size to which the part would be made if there were no variations in production, that is, if it were possible for the production equipment to turn out perfect parts.

**Types of Tolerances**—Tolerances are maximum permissible variations from the specified design sizes. There are two types of tolerances:

**Unilateral Tolerances** allow variations in only one direction from the design size. Unilateral tolerances are used extensively for the sizes of mating features of companion parts where a variation in one direction is more troublesome or dangerous than a variation in the other direction. Here, a unilateral tolerance in the less dangerous direction must be used.

**Bilateral Tolerances** allow variations in either direction from the design size. Bilateral tolerances are used on non-mating surfaces and on mating surfaces that are to be selected by size and mated with companion surfaces of selected size (as in the case of selective assembly). In the great majority of cases, bilateral tolerances should be of equal amount in both directions. In general, a bilateral tolerance of different amounts in opposite directions is evidence of either the wrong choice in the type of tolerance in the first place or in the wrong choice of the design size.

**Expression of Tolerances**—Tolerances are expressed by specifying the design size followed by the bilateral or unilateral tolerance. A bilateral tolerance in almost every case will have equal plus and minus values which are given following the dimension. A unilateral tolerance is expressed by a single value following the dimension. The two types of tolerances are shown in Fig. 3. It will be noted that no zero value is shown for the unilateral tolerance since its presence is understood anyway.

**Types of Conditions**—Examples have been given in the text to illustrate the application of the dimensioning procedure, but these are limited in extent. In practice, many cases will arise

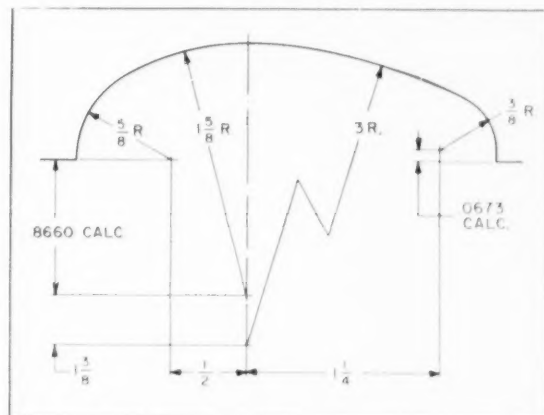


Fig. 9. Curved lines may be dimensioned by specifying properly located radii.

for which there is no precedent. The general principles of this procedure can and should be followed, however. In all cases, the conditions to be satisfied will fall into one or more of the four major classifications, namely: size, form, position, and functioning. Due consideration must always be given to the design of the inspection gages which result from the dimensional specifications given, and the conditions on the component that such gages will accept. The specification of the dimension and the tolerance is but one part of the problem; they must be measurable and measured.

### Specifying Conditions of Size

The problems of size, particularly of those on elementary surfaces, are relatively simple, both for their dimensional specifications and for the translation of such dimensions into specific inspection gages. They are expressed on the detail drawing either by giving their design size and a tolerance or by giving their limiting dimensions directly. This is a practice which is now widely followed.

**Dimensions for Conditions of Size**—As shown in Fig. 4, dimensions are to be arranged to give required dimensions directly, thus avoiding the necessity to calculate, scale, or assume anything

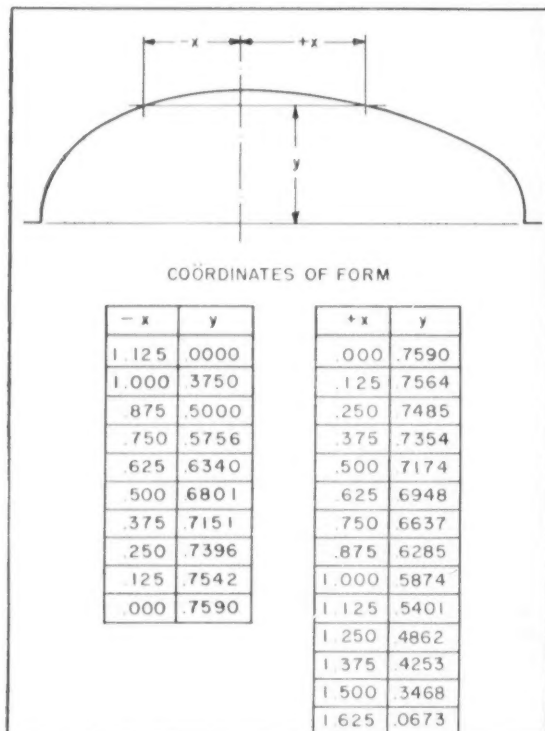


Fig. 10. Another way of dimensioning curved lines is by giving the ordinates and abscissas of points on the curve.

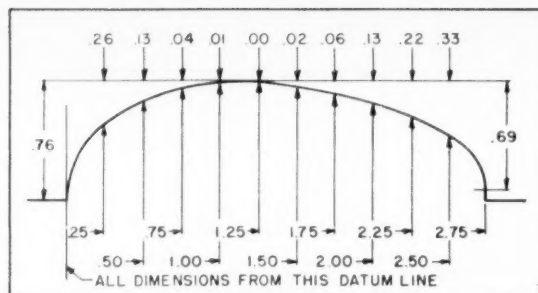


Fig. 11. If the exact form of a contour is not important, then the coordinates may be scaled from a layout and given to two decimal places.

in order to produce or inspect the visible outlines wherever possible and not from hidden lines. Hole locating dimensions and hole sizes are to be shown in the plan view of the hole. The locating dimensions are constructional ones and never carry a tolerance directly. Hole sizes are to be shown on leaders wherever possible.

Dimensioning is placed outside the outline of the part and between the views whenever possible. Where center lines are used as witness lines, they are shown as such beyond the outline of the part.

**Limits**—The limiting dimensions shown in Fig. 5 give the same information as the dimensions and tolerances in Fig. 4. The dimension line must not pass through a dimension figure, nor should a dimension figure be placed on the outline of the part, or on center lines.

**Crossing of Witness Lines**—Crossing of witness lines should be avoided wherever possible. When crossing is necessary, (as seen in Fig. 6) the witness lines are not broken at the point of intersection.

**Chamfers**—In dimensioning chamfers, as seen in Fig. 7, it is preferable to use dimensions rather than notes. In cases where space limitations exist, 45-degree chamfers may be specified by note. Tolerances are seldom needed on chamfers. When some restriction must be specified, it is generally met by giving the value as MAX or MIN, as the case may require.

**General Tolerances**—The inclusion of a note specifying a general tolerance for all dimensions where definite tolerances are not expressed is often the cause of much needless controversy. When needed for the purposes of simplicity, such notes should apply only to particular features, such as: *TOLERANCES FOR ALL CHAMFERS ARE + - UNLESS OTHERWISE SPECIFIED*; or, *TOLERANCES FOR ALL DRILLED HOLES ARE + - UNLESS OTHERWISE SPECIFIED*, and so on.

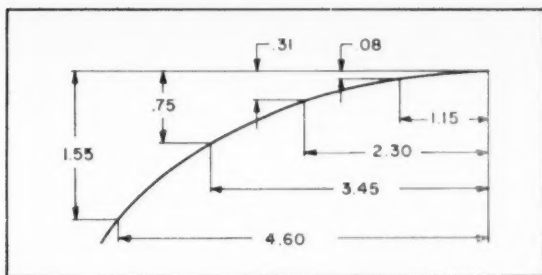


Fig. 12. Oblique witness lines may be used to avoid crowding of dimensions or to clarify and improve the appearance of the drawing.

### Specifying Conditions of Form

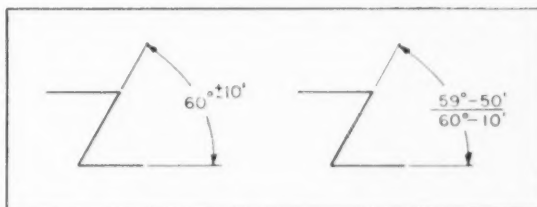
The problems of form are many and varied. They are more complex than problems of size. Groups of dimensions are involved and they must be treated as groups. The requirements of identity may be important or unimportant. In either case, an explicit control is needed if the detail drawings are to be complete.

**Direction of Measurement**—In general, the effort should be made to express the permissible variations in terms of a metal or profile tolerance such that the variations are measured in a direction normal to the surface of the form. One exception occurs when the forms are simple geometric ones where some other measurement will be more effective, such as a tapered surface of a cone. In this case, the axial displacement of the form gives the most effective measure of its variation. The form of the taper is measured by a double taper gage. On cones, there is, in effect, a multiplication factor so that the axial displacement is much greater than the amount of the tolerance normal to the surface. The examples given in the text should be sufficient to at least indicate the method of attack on the problem of form.

**Contours**—It is generally inadvisable to specify a tolerance on each dimension of a contour because of the objectional accumulation of these tolerances and the indeterminate form of the contour so defined. In addition, the measurement or inspection of such contours is generally made by a comparison of the finished contour with a master contour of the design sizes. The dimensions for the design contour are constructional ones, and such dimensions never are given a tolerance.

In such cases, a *metal tolerance* is specified for the contour. The metal tolerance represents the amount of metal added or taken from the surface measured in a direction normal to the surface. A *plus* metal tolerance permits additional metal on the surface, as compared to the

Fig. 13. In specifying an angle, either the tolerance on the design size of the angle or the limiting sizes of the angle may be shown.



design contour. A *minus* tolerance permits metal to be removed from the contour. An example of this specification of metal tolerance is shown in Fig. 8. In this case, the finished contour can vary plus or minus the specified metal tolerance at any point on its form. That is, the contour must lie within a tolerance band 1/16 inch wide.

**Curves**—A curved line may be dimensioned either by radii properly located, seen in Fig. 9, or by ordinates and abscissas. If the form is important functionally, the coordinates should be

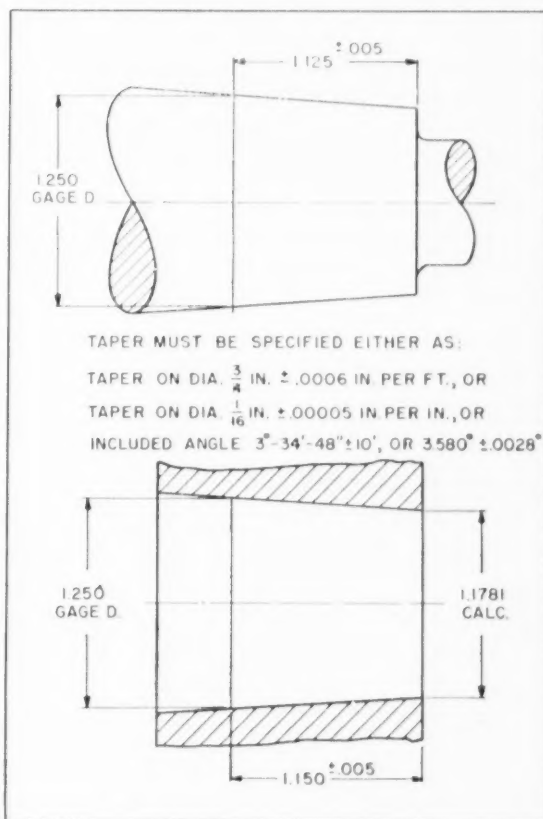


Fig. 14. Tapers are generally dimensioned by showing a gage diameter, the position of the gage diameter, and the amount of taper per inch or foot.

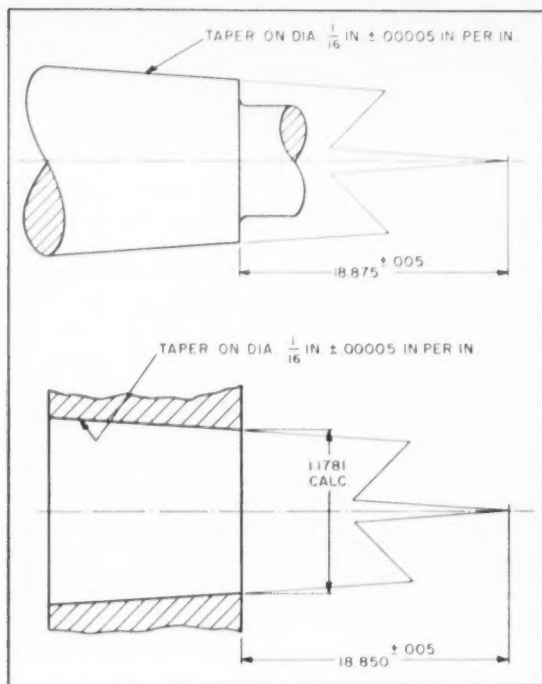


Fig. 15. Tapers may also be dimensioned by using a gage diameter of zero, or the apex of the cone of the taper.

calculated and shown in a table to whatever degree of accuracy may be needed as shown in Fig. 10. If the exact form is not important, then the coordinates may be scaled from a lay-out and be given to two decimal places, seen in Fig. 11. Oblique witness lines may be used when it is advantageous to avoid crowding or to clarify and improve the appearance of the drawing, as shown in Fig. 12.

**Forms of Geometrical Curves**—When the error in the form of some geometrical curve, such as a circle or the involute of a circle, must be controlled within definite tolerances independent of the conditions of size, the tolerance on such a form must be specified by a suitable note. For example, the diameter of a high-speed shaft might be allowed to vary several thousandths of an inch but its form must be cylindrical within 0.0002 inch. The note for this condition of form could read: *CYLINDRICAL WITHIN .0002 TOTAL RUNOUT*. The shaft could be checked for form in a V-block with a dial indicator.

A similar note would be used for the form of a cam when its shape or actual action is more important than its size. In such a case, the product would be compared with a master cam in a suitable comparator.

**Angles**—An angle represents a form composed of two straight lines. Either the tolerance

on the design size of the angle or the limiting sizes of the angle may be specified, as shown in Fig. 13.

**Tapers**—A taper is a composite surface that includes both conditions of size and conditions of form. Tapers are generally dimensioned by a fixed diameter (gage diameter), the position of this diameter, and the taper per inch or foot, each with tolerances, as shown in Fig. 14. The gage diameter is a constructional dimension and carries no tolerance.

In many cases, the use of a gage diameter of zero, or the apex of the cone of the taper, will keep the dimensions away from the outline of the component and make for a clearer drawing. This is shown in Fig. 15. It is good practice in either case to give the calculated diameter at the small end of a taper hole to save additional calculations when the size of the drilled or bored roughing cut must be established.

**Flatness Tolerances**—The tolerance relative to flatness is covered by a note which specifies the direction and amount of deviation from a true plane, as shown in Fig. 16.

**Parallelism Tolerances**—The tolerances relative to parallelism are specified by notes. The tolerance is expressed in terms of the linear deviation from parallelism per inch, as shown in Fig. 17 below.

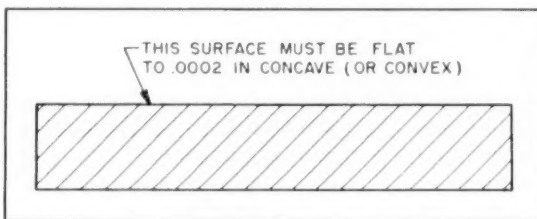


Fig. 16. Flatness tolerances can be covered by a note as shown here.

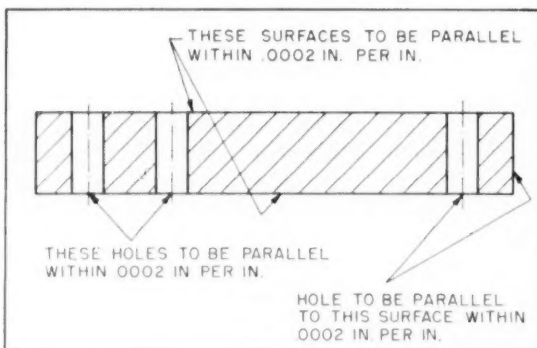


Fig. 17. Tolerances relative to parallelism are specified by notes.





## Buick Fender Production Involves Mash Welding

Blank is first formed and seam-welded into a conical shape. After drawing, trimming, and restriking, the mash weld is made. A final spanking completes press operations.

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**P**RODUCTION of rear fenders for Buick automobiles involves a series of operations performed in the sheet metal plant of the Buick Motor Division, General Motors Corporation, Flint, Mich. Fabrication of these fenders, which are deep and narrow when completed, would not be feasible without the use of welding.

Blanks of 0.040-inch thick steel are rough-formed by air-operated dies in the resistance welder shown in Fig. 1. This machine brings two edges of the blank together and overlaps them a sufficient amount for a seam weld. The weld is produced by a wheel which is lowered while be-

ing pressed against the vertical seam. The rough-formed and welded piece, which has a somewhat conical shape, may be seen at the extreme left in Fig. 2. This shape conforms roughly to the general shape of the drawing die shown in Fig. 3, and will fit readily into it.

Although the blanks have been preformed, the severity of the draw is sufficient to cause some fractures, such as may be seen on the drawn part, second from the left, in Fig. 2, and on the left-hand side of Fig. 3. Usually, however, the fracture is confined to an area that is to be trimmed off and is therefore of no significance.



**Fig. 1. Initial forming and seam welding of blanks for fenders of Buick automobiles are performed in this resistance welding machine.**

After the drawn stamping has been trimmed and small pilot holes have been pierced in the closed end, the piece is transferred to another resistance welder, shown in the heading illustration. In this welder, of 250-K.V.A. capacity, the fender is clamped vertically with its closed end up. Pilot-pins, one of which is shown in Fig. 4, enter mating holes and serve to space the 3/16-inch overlap where the mash weld is to be made.

Clamping is accomplished by two side gates that are rocked into place by air cylinders. This locks the 3/16-inch overlap above a horizontal

copper backing that is situated below the seam. When the locking is completed, the welding wheel is lowered into contact with the overlap and proceeds to form the weld as it rolls. A surface speed of 28 inches per minute is maintained during the operation.

During the welding cycle, the welding wheel is forced against the seam under a total pressure of 1680 pounds. The pressure is applied by an air plunger which acts against the rear end of the rocking lever that supports the wheel. This amount of pressure is applied on a small contact area which is simultaneously heated to fusion

**Fig. 2. Buick rear fenders as they appear, (left to right) after successive major steps of production as follows: forming and seam welding; drawing; trimming and mash welding; and finally, forming of rear end**



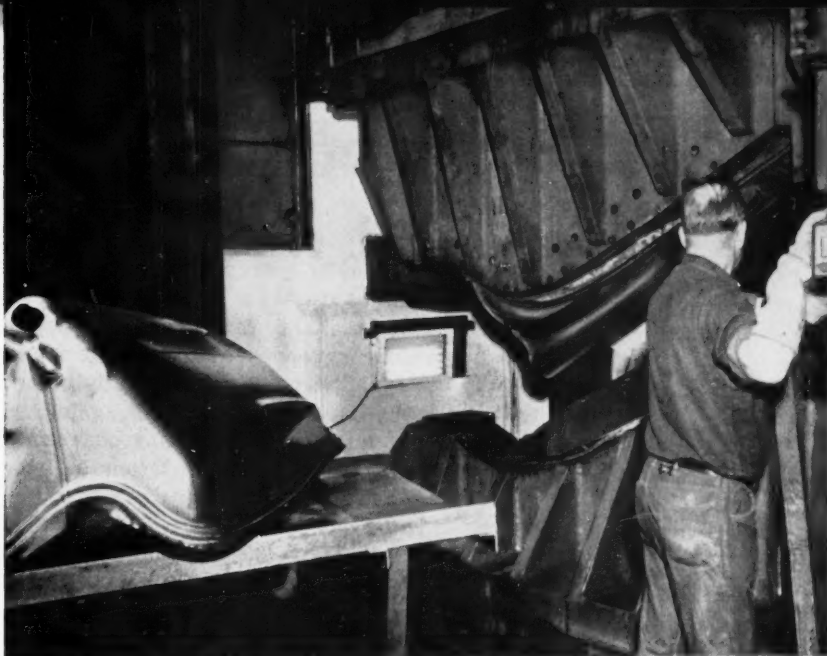


Fig. 3. Drawn fender, at left, as it appears after coming from the drawing die seen at the right and before the excess metal has been trimmed off.

temperature. The pressure is sufficient to mash the weld to the extent that its final thickness does not exceed a single thickness of 0.040 inch of sheet by more than 10 per cent. In other words, the double metal thickness at the overlap of 0.080 inch is reduced to 0.044 inch maximum as a result of the mashing action. When cycle is completed, the mash weld is flat and straight.

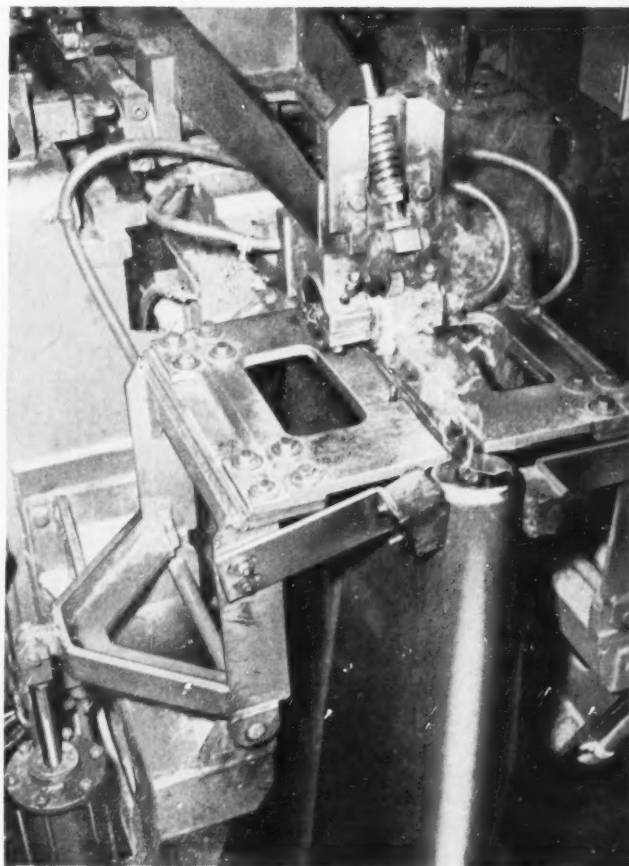
It is still necessary, however, to complete the boss so that it projects. The boss, shown second from the right in Fig. 2, was partly formed in two halves in a previous draw operation. For this final forming, or spanking, the fender is placed vertically over a horn die in a press and is struck when the die closes. This not only reforms the central boss, but also the whole rear end of the fender, thus imparting its final contour, as may be seen at the right-hand side of Fig. 2. Later operations pierce out the lamp openings and other holes that are needed for fastenings.

Initial planning called for making the final weld by an inert gas-shielded arc after final forming had been completed. This, however, involved making the arc follow an irregular contour, and the compound motion that was required introduced complexities that are avoided now by mash welding and then forming. A minimum amount of dressing is needed on the mash welded joints. The fenders are welded at a rate of 150 per hour, which is in step with the other operations performed on the parts.

\* \* \*

In 1953 about 296,000 tons of zinc went into die castings, compared with only 13,000 tons of zinc a year in 1925.

Fig. 4. Close-up view of the mash welding operation during which pressure applied on the welding wheel reduces the 3/16-inch wide lap joint to approximately a single metal thickness



# Speed Lathes at Work



**S**PEED lathes today render yeoman service by performing a variety of finishing operations at a profit. Traditional activities of the bench hand—filing, deburring, grinding, polishing, and lapping—are in many plants now relegated to these little lathes. Often too, the speed lathe frees a heavy, expensive turning or boring machine tool for more needed production by permitting a finishing operation to be completed independently of the machining cycle.

Basically, the speed lathe is an electric motor, generally of small horsepower, with provision for supporting the work on the end of the spindle. The design is flexible, there being available both bench and floor models, with the plane of the motor either horizontal or vertical. Motors may be of the single-speed, two-speed, or variable-speed type. Collets, jaw chucks, vacuum chucks, magnetic chucks, and expanding mandrels afford a variety of means for holding work. Control is by lever or pedal, either of which may simultaneously de-energize and brake the motor, or merely open and close the work-holding device. Some speed lathes have a tailstock, a cut-off slide, or a grinding attachment mounted on a compound slide as accessory equipment to perform a specific function.

The heading illustration shows a speed lathe application of stoning a burr left on a hardened steel ring. This unit was made by the Schauer Mfg. Corporation, Cincinnati, Ohio. A 6-inch universal chuck holds the work. The motor control lever operates an integral brake to bring the spindle to a fast stop.

The other two illustrations in this article also show Schauer speed lathes in operation. In Fig. 1, two units are used to polish a conical brass adapter. The work, which is running at 3450 R.P.M., is held in a collet. Loading and unloading are performed by actuating the collet without stopping the rotation of the spindle, resulting in a production rate of 240 parts per hour. For other polishing operations, such as on small gears and pinions, it is possible to control the collet and the motor from one operating lever and then stop the lathe to protect the operator's fingers when loading and unloading.



**Fig. 1. The operating lever of these speed lathes can be positioned vertically as well as horizontally, and on either side of the spindle, to suit the worker's convenience.**



Fig. 2. Holding the work on a mandrel permits both faces of the flange to be filed.

A floor model, Fig. 2, which is equipped with an air-operated expanding mandrel, is being used to file the edge of a cast-iron flange. As can be seen, pedal control of the machine leaves the operator's hands free to handle the work. A variable-speed motor, 600 to 3600 R.P.M., gives the machine the necessary range for both filing and polishing.

\* \* \*

### Automatic Wire Sizing and Cutting Machine Eliminates Hand-Snipping

Bench mechanics at the Temco Aircraft Corporation, Dallas, Tex., are cranking out safety wires of correct length instead of hand-snipping them to size. An automatic wire-sizing and cutting machine developed at the plant turns out 11 1/2-inch lengths of 0.041-inch diameter wire at a rate of one per second. When an aluminum wheel on the bench-mounted machine is cranked, as shown in the accompanying illustration, it operates a pull-rod attached near its rim. The pull-rod, in turn, activates a clamp mounted on a carriage that grabs and unreels the required length of wire from a 5-pound spool at one end of the machine.

Wire is pulled the length of the machine through an aluminum tube, and emerges through an 0.062-inch diameter bushing, over which is mounted a tool steel cutter with a shear edge. A "cutter pressure roller," which is mounted near the rim of the wheel, contacts the top of the cutter with each revolution of the wheel, pressing it down to cut the wire protruding from the bushing. A small spring raises the cutter after each slice is made. Another flat steel spring keeps pressure on the spool so that wire will not backlash or unwind too freely.

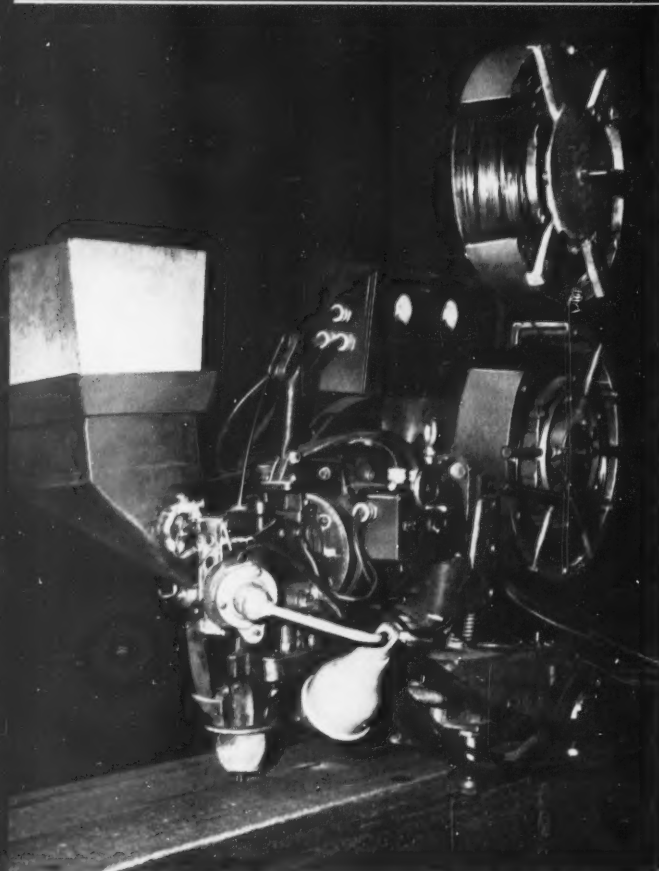
The lengths of the wires cut can be changed by moving the point at which the pull-rod connects to the wheel. Twice the distance on the wheel—from dead center to the point where the pull-rod is attached—equals the length to which the wire is cut. Also, the pressure put on the wire by the clamp that unreels it from the spool can be increased by lengthening a pressure lever, which is a short rod joining the pull-rod to the clamp. Increased pressure would be required, for

Safety wires, 0.041 inch in diameter, are automatically fed to the required length and cut off at the rate of one per second on this bench-mounted machine.



example, to pull stiff, heavier-gage wire off the spool. If the need should arise, the machine could be driven by a 1/8-H.P. electric motor. As requirements now stand, however, a mechanic can crank out a week's supply of wire in a few minutes.



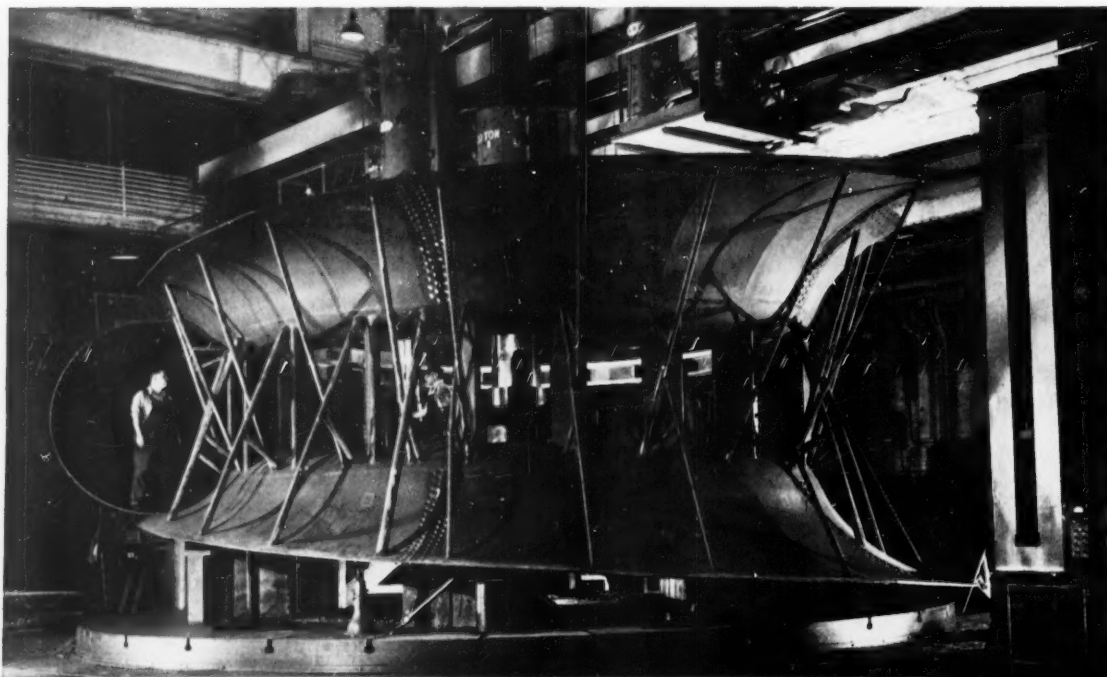


## In Shops Around

Camera highlights of some interesting operations performed in various metal-working plants throughout the nation

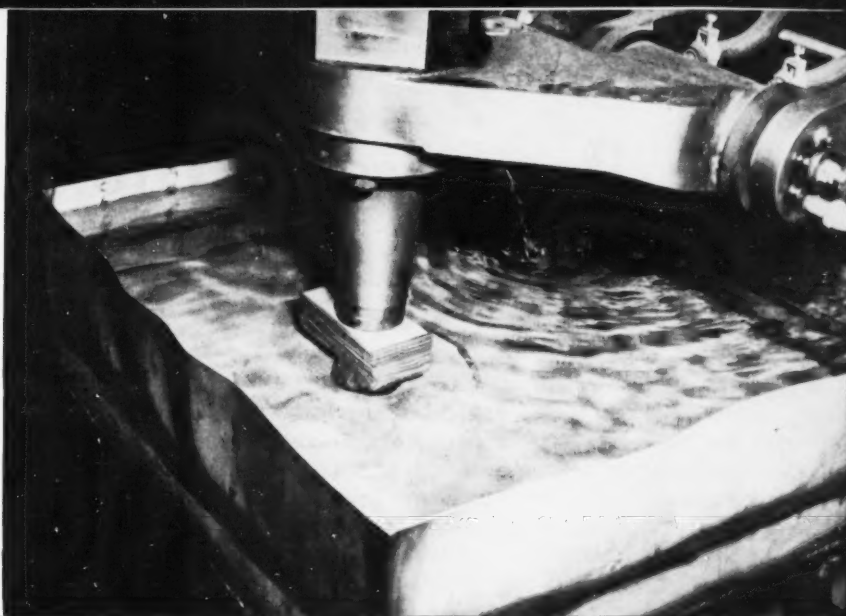
Featuring two electrodes connected in parallel, this Unionmelt machine automatically welds center sills for box cars at the Havelock, Nebr., shop of the Chicago, Burlington, & Quincy Railroad. The 40-foot seam in the 3/8-inch thick steel sill is submerged-arc welded in a single pass in ten minutes.

The inside of this huge cast-steel stay ring with attached scroll case skirts is being machined on a 40-foot vertical boring mill at the Allis-Chalmers Mfg. Co., Milwaukee, Wis. This stay ring is for one of eight 57,500-H.P. hydraulic turbines in construction for the power plant at Fort Randall, S. D.

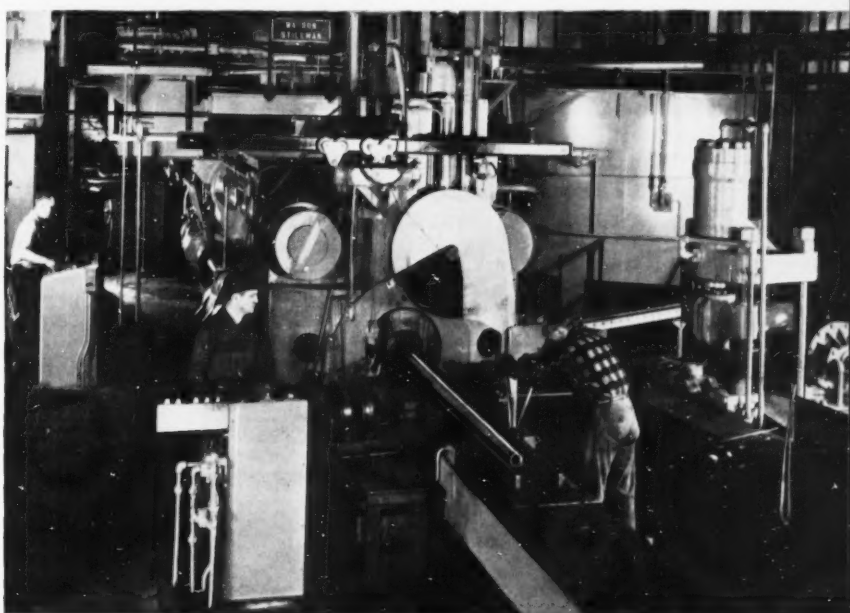


# the Country

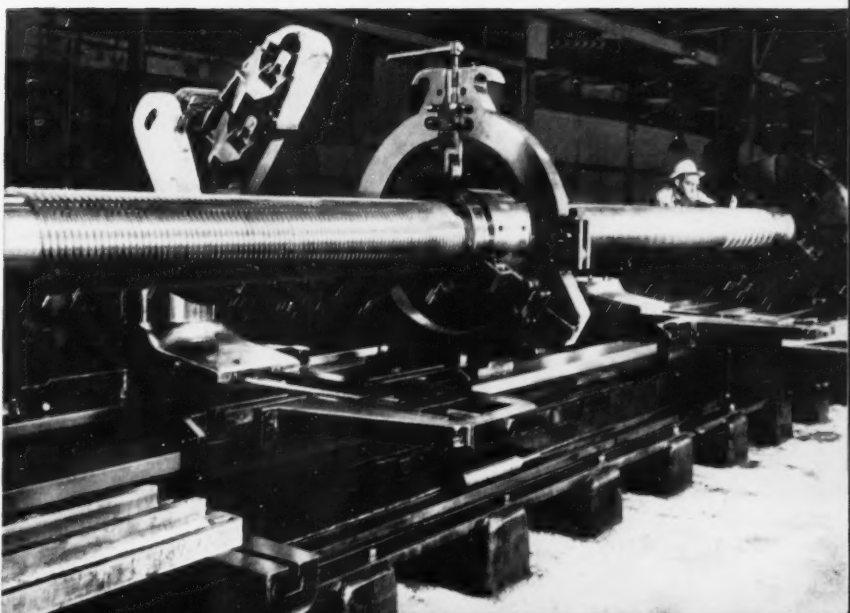
Resistance welding laminations in a liquid medium at the Glenn L. Martin Co., Baltimore, Md. The cooling effect of the medium permits a weldable thickness of 3 inches in stainless steel and 6 inches in titanium. Excellent properties of test specimens and ability to utilize scrap may extend laminate design to many airframe parts.



Drawing seamless tubing on a new Watson-Stillman horizontal hydraulic extrusion press at the Waterbury, Conn., works of the American Brass Co. The press has a double-action power of 2300 tons—1900 tons on the main ram and 400 tons on the piercing ram.



Machining a quintuple thread on a 27-foot long operating screw at the Torrance, Calif., plant of the National Supply Co. A row of five single-point cutters simultaneously produces the thread. The belt sander seen on the lathe carriage polishes the outside diameter of the screw.



# Progressive Die Produces 5000 Ferrules an Hour

**O**UTER ferrules for the electric cord protectors furnished with General Mills "Tru-Heat" flat irons are produced at the rate of 5000 per hour on an eight-station progressive die equipped with a rotary indexing, work-carrying plate. The ferrules, which retain the protecting springs, are made from deep-drawing quality brass (A.S.T.M. Grade B36), 0.009 inch thick, on a Niagara 28-ton press, as seen in Fig. 1.

The unique progressive die was designed by tool engineers at the Mechanical Division of General Mills, Inc., Minneapolis, Minn. As shown in Fig. 2, which is a developed drawing of the die, all of the punches except blanking punch *D* are held on plate *A*, which is mounted on the press ram. The work-pieces are transferred from station to station by a rotary carrier plate *B* which is indexed by linkage from an eccentric bolted on the end of the press crankshaft. Holder *C*, over which the carrier plate slides, carries the dies for forming and piercing the bottom side of the ferrule.

Round blanks are cut from the brass coil stock by punch *D*, and the blanks are stripped from the punch and nested in openings in plate *B* by

a spring-loaded pin *E*. To maintain quality, it was found necessary to produce accurately round blanks free of burrs. For this reason, the close-fitting blanking punch and die have a maximum clearance of 0.0004 inch. The second station is idle, and, when the blank is carried to the third station, it is drawn into a cup by punch *F*. Spring-loaded stripper *G* keeps the cup in the carrier plate as the press ram and punch rise.

At the fourth station, punch *H* pierces a hole in the bottom of the cup, the slug falling through a tube leading to a container. Lower and upper portions of the ferrule are curled to the required form at the fifth and sixth stations, respectively. Here, a spring-loaded rocker arm *J*, actuated by a centrally located pilot *K* on the press ram, lifts forming punch *L* and die *M* as the ram descends.

Punch *L* forms the lower portion of the ferrule upward and around a hollow die *N*. Pin *O* strips the ferrule from this die as the press ram rises. At the sixth station, spring-loaded forming die *P* enters into and rests on carrier plate *B*. Simultaneously, form die *M* is pressing the ferrule upward, thus completing the top form of the ferrule without disturbing the lower form. The ferrule rests on the flat top surface of holder

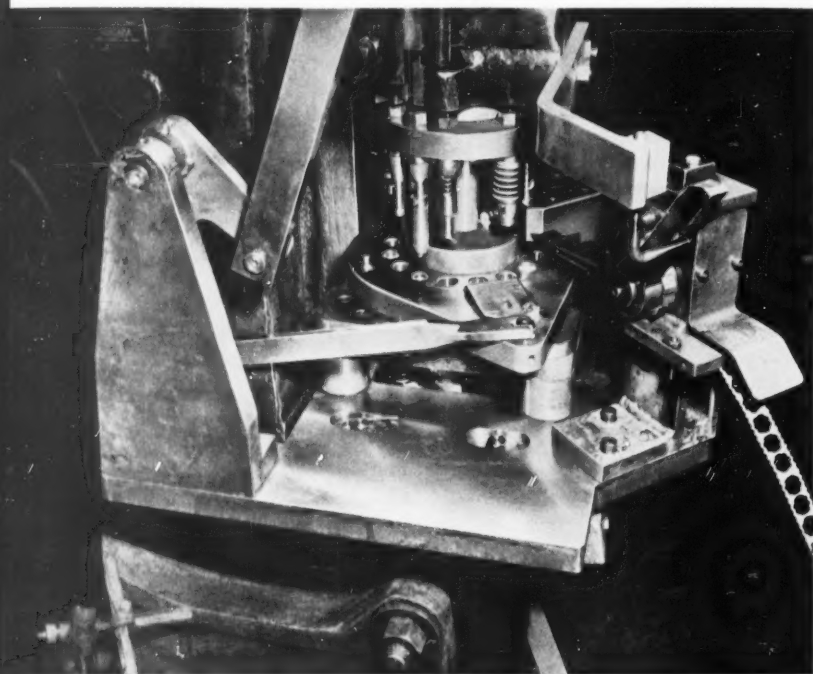


Fig. 1. Close-up view of die for producing brass ferrules at the rate of 5000 per hour on a 28-ton press



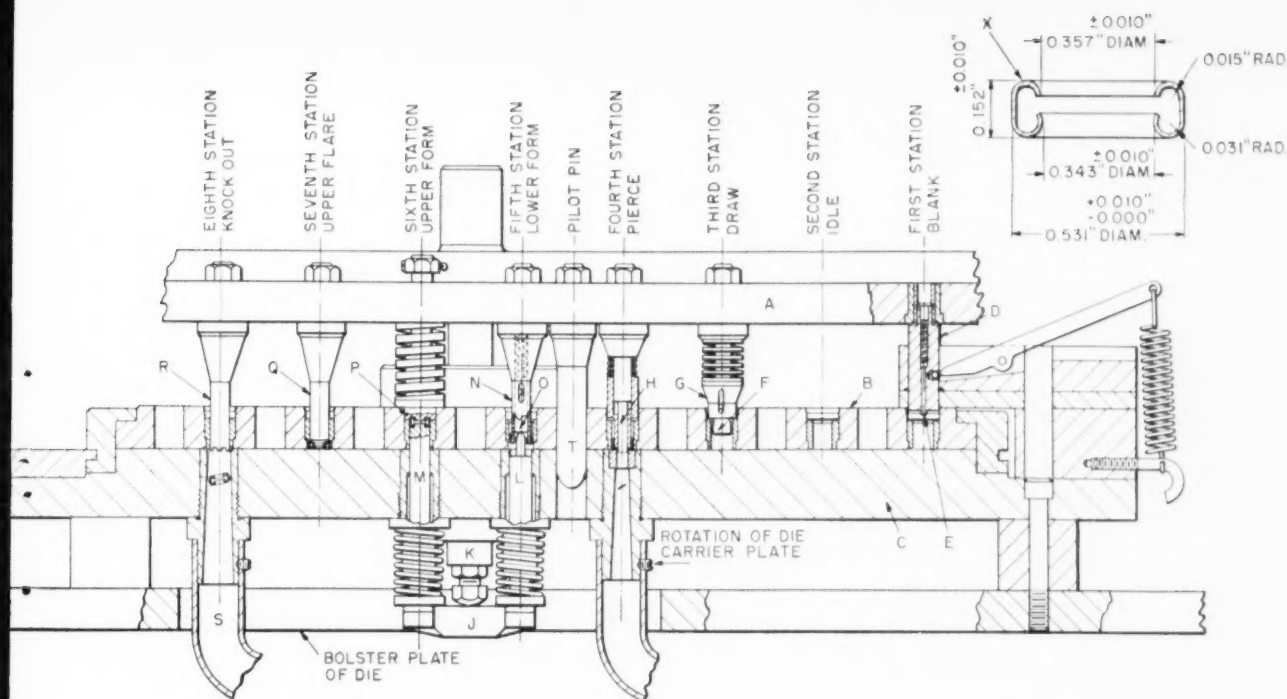


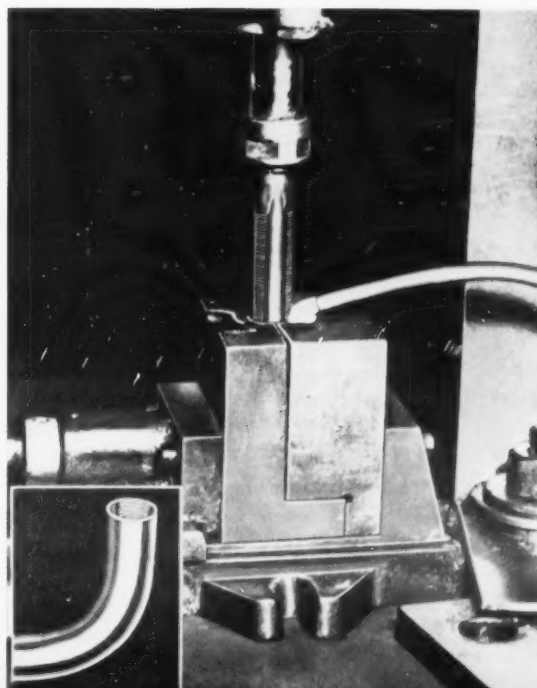
Fig. 2. Developed drawing of the eight-station progressive die employed on the press seen in Fig. 1

*C* at the seventh station, while flaring punch *Q* further forms the bottom portion of the ferrule.

Completed ferrules are pushed down through the carrier plate at the sixth station by knock-out punch *R*, and they fall through a tube *S* leading to the tote box. A finished ferrule is seen at *X* (upper right in Fig. 2).

Positive location of the carrier plate is insured by pilot *T* entering holes in carrier plate *B* and holder *C* when the press ram descends. The coil stock is fed below the blanking punch *D* by a pawl and ratchet mechanism, which is also actuated by the press ram. This mechanism crimps the scrap stock as shown.

At the Standard Tool & Machine Co., St. Louis, Mo., tapping of 100 per cent threads in the end of thin-walled aluminum tubing was a time-consuming, messy operation. The cutting compound used was a mixture of one-half mineral oil, lard, and turpentine; and one-half industrial wax. It was applied to the tap by hand with a brush. Now a Norgren Spray-Lube system has been installed, as shown in this set-up, in which lubricant is being sprayed directly on the tap. Machine output has been increased 35 per cent, and the operation is much more efficient. Manual lubrication has been eliminated, and better tapping quality has been produced.



# Materials OF INDUSTRY

The properties and new applications of materials used in the mechanical industries

## **"Plastic-Metal" for Making Jigs and Fixtures**

A product composed of a combination of fine steel powder and a special plastic, called Devcon, has been announced by the Chemical Development Corporation, Danvers, Mass. It is as easy to form as modeling clay and is used for making durable and permanent drill fixtures and jigs, forming and drawing dies, and holding devices. Devcon becomes a strong, tough, and rigid metallic piece in approximately two hours after being formed in the desired shape and then allowed to harden.

In the hardened condition, it exhibits the following physical properties: tensile strength, 10,000 pounds per square inch; compressive strength, 15,000 pounds per square inch; and a hardness of 75 on the Rockwell F scale. Other properties include non-shrinkage and non-distortion characteristics; resistance to many solvents, oils, and acids; capability of plating with chromium, nickel, or copper by conventional methods; and a long storage life (minimum of twelve months under normal conditions).

## **Metal Filler that can be Milled, Tapped, or Ground**

A cold-applicable, waterproof, rustproof, non-shrinkable metal filler that will not crack, chip, or peel has been brought out by the All-State Welding Alloys Co., Inc., 249-55 Ferris Ave., White Plains, N. Y. This "cold solder" can be spread by spatula, putty knife, or rubber squeegee. All-State Metal-Filler, as it is called, dries into a solid metal-like substance which resists the harmful effects of heat in a temperature range of from minus 40 degrees F. to plus 360 degrees F. It exhibits the following additional properties: tensile strength, 650 pounds per square inch; hardness, 4 to 8 on the Rockwell E scale; and specific gravity, 1.95 at 75 degrees F. The material is said to form a permanent bond with any metal, wood, plastic, or glass and once applied can be milled, drilled, tapped, ground, and filed.

The filler can be used to repair blow-holes, surface blemishes, and rough porous places in metal castings and metal surfaces; build imperfect castings to desired dimensions; make tank seams leakproof, repair pipe leaks, rebuild worn surfaces, repair metal parts where the application of heat would create undesirable stresses, strains and distortions and fix sheet metal surfaces such as guides, gutters and tanks.

## **Highly Viscous Tool Plastic Material Builds up Metallic Surfaces**

A plastic tooling material that consists of a metal filler containing hardener and a resin which have to be blended together for five minutes has been made available by Rezolin, Inc., 5736 W. 96th St., Los Angeles 45, Calif. This material, known as L-930 Surface Casting Resin (Metallic), has a metallic appearance, a low viscosity, a two- to four-hour hardening time at room temperature, and an ability to bond well with metals. It is non-corrosive.

Uses to which the material can be put are resurfacing metal dies, leveling die bases to eliminate machining; and making form-blocks, foundry patterns, and core-boxes. It can also be used for jig locator pads and hydraulic press wedge blocks.

## **Anti-Seize Compound for Threaded Connections**

Protection against the welding action of threaded connections subjected to prolonged exposure at high temperatures by the use of Thred-Gard, a compound developed by the Crane Packing Co., Dept. MYN, 1800 Cuyler Ave., Chicago 13, Ill. The compound is said to eliminate seizing and galling at operating temperatures up to 1200 degrees F. Thred-Gard is non-hardening and acts as a lubricant to allow easy disassembly of threaded connections, even after lengthy service under severe conditions. Not only is dismantling time greatly reduced by its use, but damage to studs, bolts, pipe joints, and plug threads is prevented, thus permitting their re-use.

### Cobalt-Base Spring Alloy Again Available to Industry

It has been announced that Elgiloy, a cobalt-base spring alloy developed by the Elgin National Watch Co., Elgin, Ill., has been placed back on the commercial market. The alloy had been removed from the market in 1950 because of governmental restrictions on the use of cobalt and nickel.

This non-magnetic alloy is composed principally of cobalt (40 per cent), chromium (20 per cent), and nickel (15 per cent). It is noted for high hardness, toughness, tensile strength, corrosion resistance, and fatigue resistance. The alloy is available as raw-stock, and in heat-treated and completely fabricated form. It is commonly used as a spring material in watches and electrical appliances, and is suitable for surgical and dental equipment, drawing instruments, camera parts, and industrial control instruments where high shock resistance and a fine surface finish are essential.

### General-Purpose Aluminum Alloy Combines Strength and Economy

The development of 66S, a general-purpose aluminum alloy, has been announced by the Harvey Aluminum Division, Harvey Machine Co., Inc., Torrance, Calif. This strong, light-weight material is economical to use, since thinner sections may be employed in the making of structural elements. It exhibits a tensile strength of 50,000 pounds per square inch, a yield strength of 45,000 pounds per square inch, and an elongation of 8 per cent. Applications of this material include structural members in buildings, large motor vehicles, and aircraft; and general parts fabrication.

### Stainless Steel Tubing and Fittings Now Available

A high-strength, thin-wall, stainless-steel tubing called Flexon has been developed by the Flexonics Corporation, 1368 S. Third Ave., Maywood, Ill., for industrial uses where corrosion resistance, light weight, and special shapes or bends may be required. This tubing, which is being successfully worked into a great variety of

shapes, eliminates the need for heavy castings or multiple-piece assemblies that are welded or brazed together.

The concern makes both standard and high-strength stainless-steel straight-wall tubing. The high-strength tubing exhibits a greater yield and tensile strength for the same wall thickness due to an additional work-hardening process that it undergoes. A few typical comparisons between standard and high-strength tubing are given in the accompanying table.

Comparison of Standard and High-Strength Flexon Tubing

Designation	Tube Outside Diameter, Inches	Wall Thickness, Inches	Burst Pressure, Pounds Per Square Inch	Weight per Foot, Pounds
Standard	1.75	0.020	1455	0.378
High Strength	1.75	0.017	1750	0.324
Standard	2.00	0.012	750	0.261
High Strength	2.00	0.011	990	0.228
Standard	3.50	0.020	730	0.761
High Strength	3.50	0.021	1100	0.813
Standard	5.00	0.025	660	1.360
High Strength	5.00	0.022	805	1.223

The standard straight-wall tubing is available in fifteen outside diameters ranging from 1 to 6 inches, and the high-strength tubing comes in thirteen outside diameters from 1 1/2 to 6 inches. Ordinarily tolerances are plus and minus 0.002 or 0.003 inch. Fittings and component parts made from this tubing, such as the elbows shown in the accompanying illustration, can be attached to either straight or flexible tubing by resistance circumferential seam-welding.

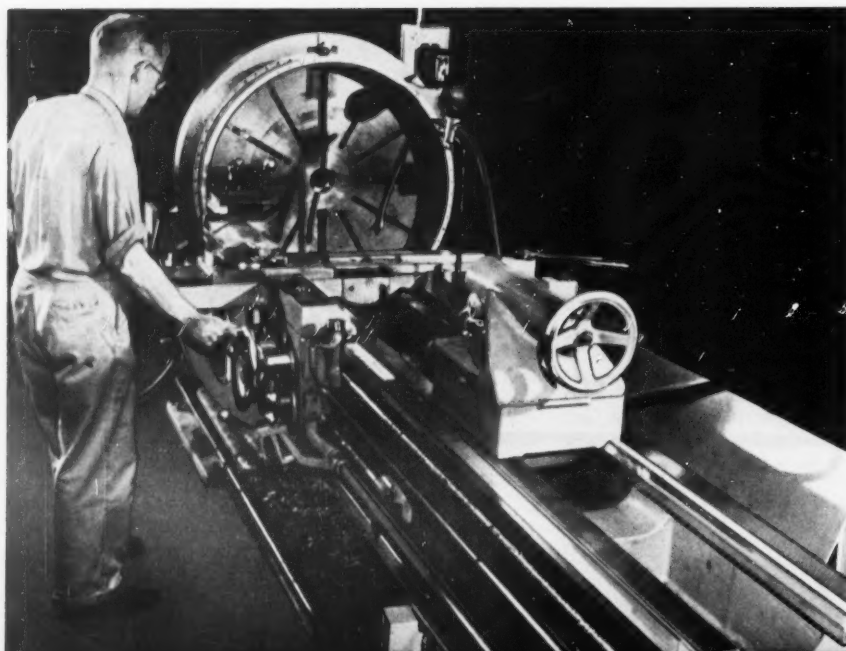
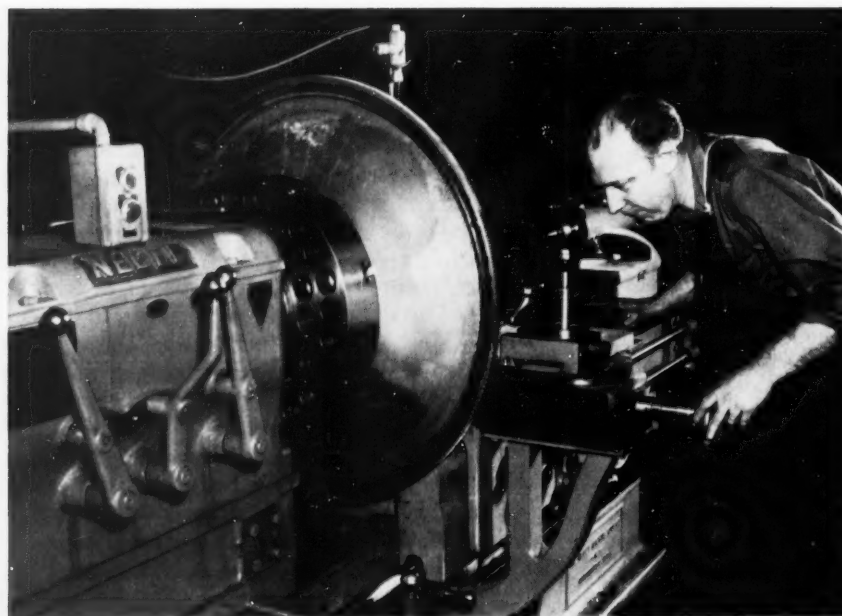


These transition elbows, each made from a single piece of high-strength stainless steel tubing of 0.026-inch wall thickness, have been bent to a right angle. The diameter at one end of the elbow is 2 5/16 inches and at the other, 2 9/16 inches. This method of bending gives smooth bends and does away with the necessity of welding or brazing half shells together as is now customary.

# Lathes Play Important Part in Jet Engine Manufacture

Production of jet-engine components ranging from magnesium and aluminum alloys to tough, heat-resisting materials requires versatile machine tools having variable-speed drives, duplicating attachments, or special tooling. Illustrated are examples of how Nebel lathes are being used in jet-engine production.

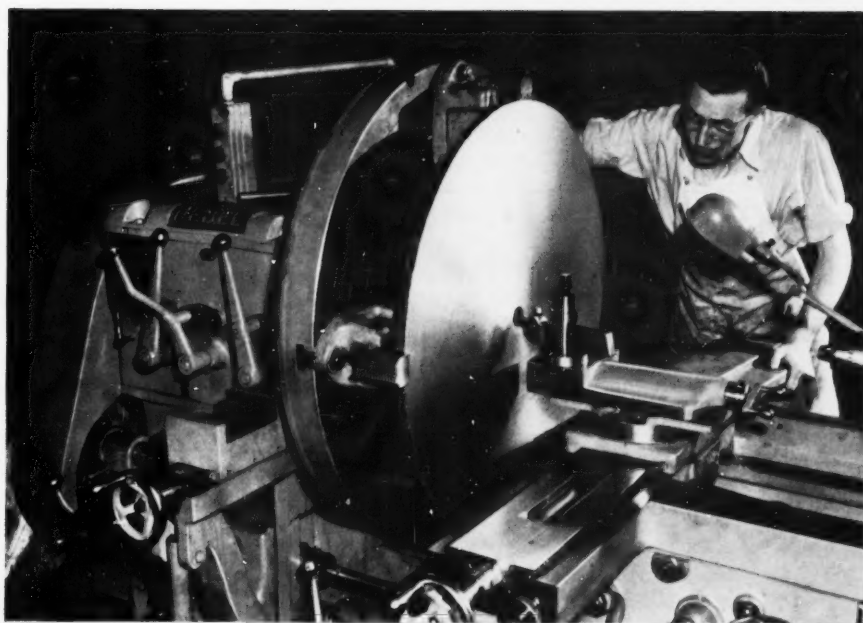
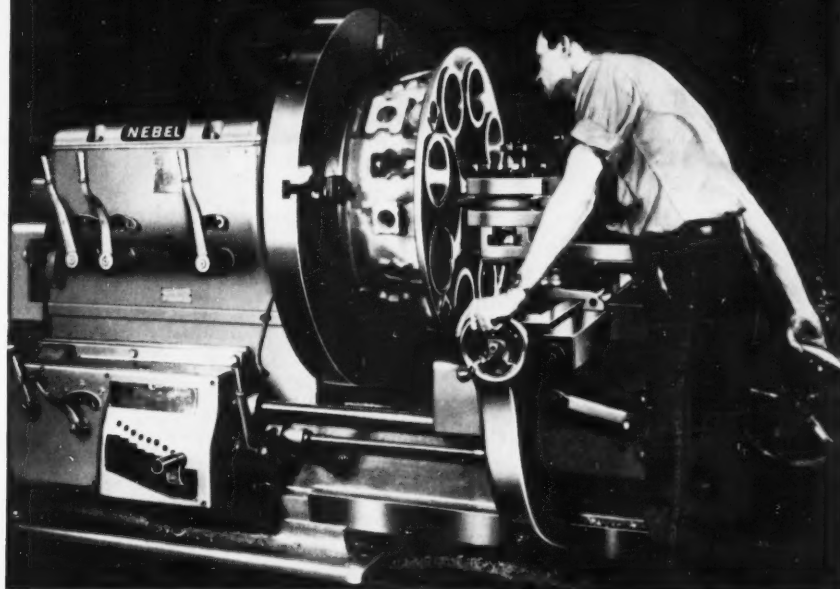
Large-diameter jet-engine part is here being machined on a Nebel 20/40-inch extension bed gap lathe.



Another extension bed gap lathe is used for a wide variety of work in the Experimental Division's machine shop at Solar Aircraft Co.

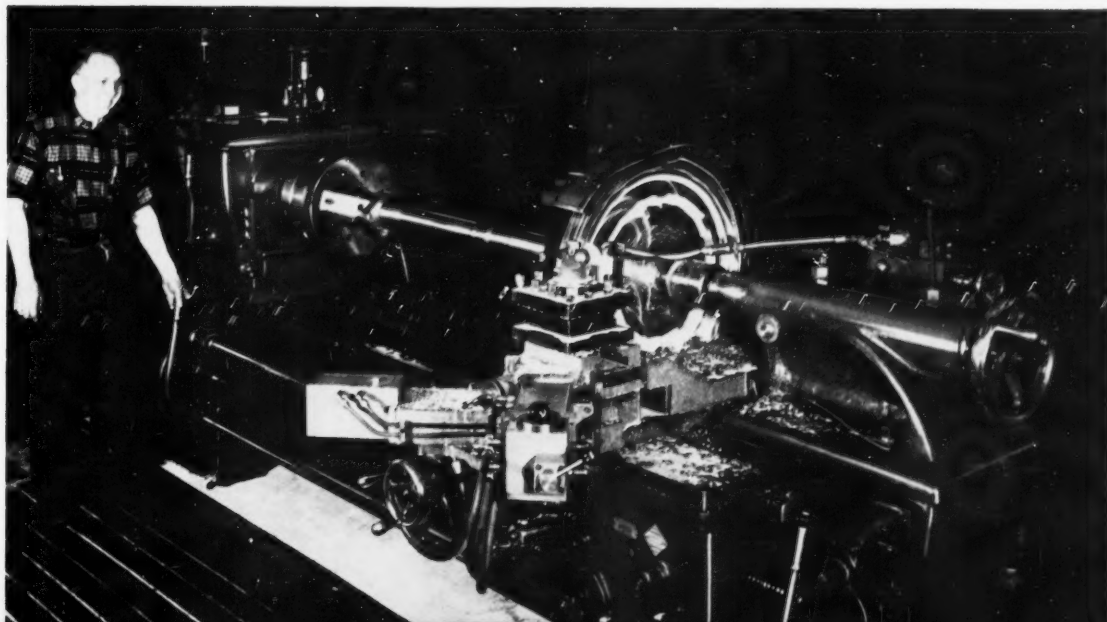


A large aluminum-alloy compressor rear frame is rotated at 170 R.P.M., and tool is fed at rate of 0.010 inch per revolution.



(Left) Versatility of lathe is exemplified by this facing operation which is being performed on a thin large-diameter disc for a jet engine.

(Below) Jet-engine turbine wheel and shaft are machined at Packard on Nebel 36-inch lathe with Reliance variable-speed drive.



# How to Design Drill Jigs

Reduction in the manufacturing costs of duplicate parts for interchangeable assembly is the prime purpose of the drill jig. To accomplish this efficiently, the jig must be designed to function rapidly and maintain a high degree of accuracy over long periods of hard usage. Second and concluding installment

By H. C. TSIEN, President  
Central Technical, Inc., New York City

SOME of the problems facing tool designers were described in the preceding installment of this article, which appeared in May MACHINERY, page 196. Included was a discussion of commercially available jig components; basic methods of work positioning; and the necessity of good judgment on the part of the tool designer. In this final installment, several conventional types of drill jigs will be described, together with their application and operation.

Comparatively simple construction denotes the screw jig shown in Fig. 1, which is usually designed for drilling holes through thin discs. The jig consists basically of two threaded members that fit together in the same way as do a nut and bolt. Both parts are knurled on their periphery for ease of handling. Drill bushing *A* is located in the cover, or nut portion, *B*. Also positioned in the cover is a locating pin *C*.

In operation, the work-piece is placed on the male portion *D* of the jig and the cover screwed in place. At the same time, the locating pin centers the work. A clearance hole *E* allows the chips to pass through and collect in the relieved portion *F* of the jig base. Because loading and unloading is slow, this type of tool is not recommended for large-quantity production.

A cover type drill jig is well suited for drilling many pieces of thin material. An example of this type jig can be seen in Fig. 2. In this case, the work-piece *A* is located within the jig body *B* by means of one round and one diamond pin, *D* and *E*, respectively. The jig cover *C* is lined up with the body, also by one round and one diamond pin, *D* and *E*, respectively.

The pins are of slightly different diameters in order to make them foolproof. Two swing C-washers *F* secure the cover in place, while two knurled-head swivel-screws, *G*, threaded through the cover, clamp the work-piece in position. All drill bushings are located in the cover.

This jig also has its drawbacks. First, the cover is a loose piece which, during storage or transportation in the plant, might become separated from the main body of the tool. There is also the fact that all clamping pressure applied against the work is transferred directly back to the cover, with the probability of distorting the bushing locations. Lastly, chip disposal is inadequate and the time required for loading and unloading, excessive.

A pump jig, such as the one illustrated in Fig. 3, consists basically of a top plate *A* in which the bushings are normally located; a rack-and-pinion mechanism *B*, with a handle *C* for raising and lowering either the top plate or the work, as the case may be; and a base *D* with guide columns *E* to insure the accuracy of the moving member. The work-piece *F* is clamped in position by raising the work through movement of the handle.

Various braking mechanisms for this jig are featured by different manufacturers, but the end result is the same—they all serve to retain the applied clamping pressure when the work-piece is locked, and may be released only by movement of the handle. Shut height can be adjusted by removing the pinion shaft and resetting it to the desired condition.

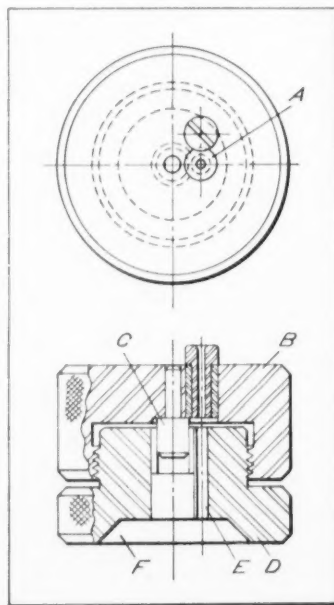
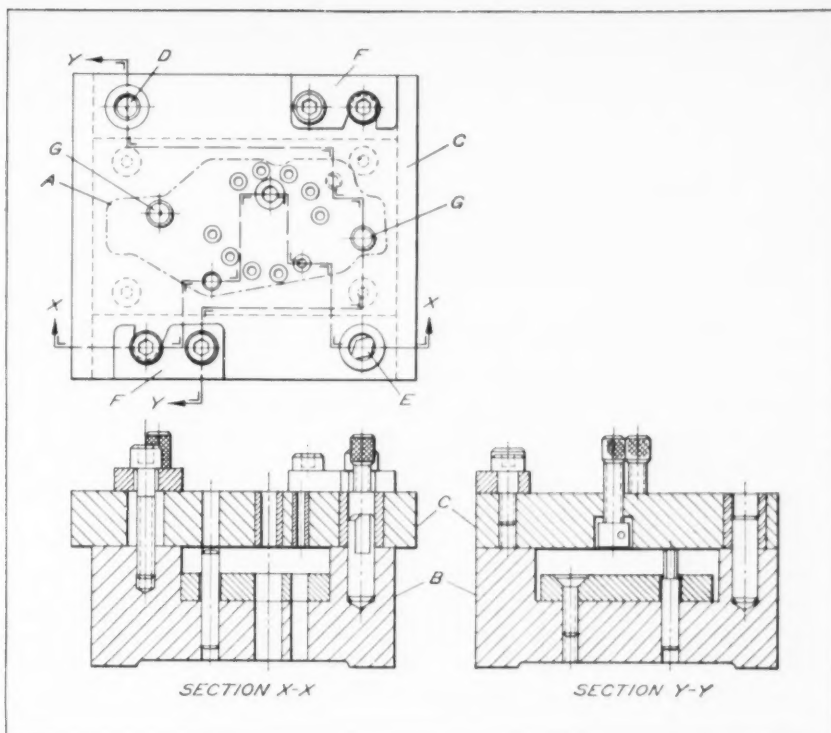


Fig. 1. This screw type jig is particularly suitable for drilling holes through thin discs. It is, however, rather slow to load and unload.

Fig. 2. The work-piece is enclosed within the body of this cover type drill jig. A bushing plate or cover is located by means of two pins and locked in place by two swing C-washers.

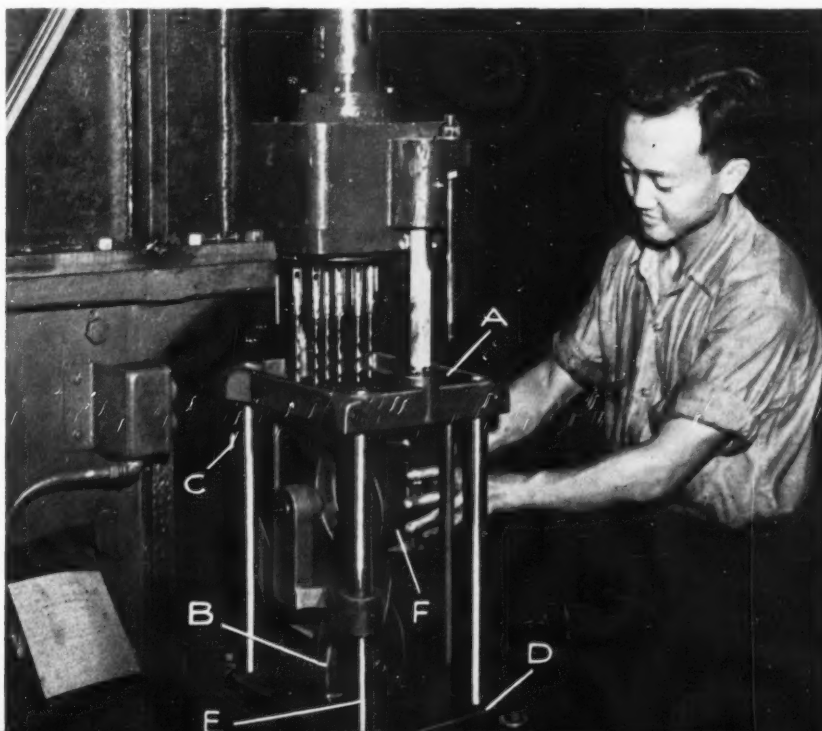


A big advantage of the pump jig is its quick action. Most parts require a lapsed time of only four seconds for placing the part in the jig and also removing it.

Another version of the pump jig is the "nutcracker" jig. It is so called because of the two long handles by which the tool is operated, these resembling a nutcracker. Commercially available models have a pinion shaft that operates on the

same principle as that of a pump jig. A simplified nutcracker jig is shown in Fig. 4. It has merely a top and a bottom plate, *G* and *H*, respectively, which are held together by hinge pin *J*. Two long handles *K* are provided for operating purposes. Tongue-and-groove construction is used on the plates to eliminate the possibility of side movement. The work-piece is, of course, sandwiched between them.

Fig. 3. A rack-and-pinion mechanism actuated by handle (C) causes the work to be locked in place for drilling in the pump jig. An integral brake maintains pressure on the work until it is manually unlocked.



Both the pump and the nutcracker jigs are especially suitable for drilling holes that need not be located from edges of the work. They are therefore ideal for parts in which the holes are to be located from the center of a plug. A disadvantage of this design is that the clamping pressure is applied by the top plate in which the bushings are mounted. This pressure will have a tendency to distort the bushing locations, although in most cases it is negligible.

### Drawer and Box Type Jigs

For small-quantity production, the drilling of thin plates can be done efficiently in a drawer type jig such as the one illustrated in Fig. 5. Bushing plate *A* is screwed and doweled to jig body *B*. Four shoulder plugs *C* are pressed into the bottom

of the tool to serve as legs. In operation, work-piece *D* is slipped into a slot formed by a recess machined across the top face of the jig body, until it contacts locating pins *E*. The part is then clamped securely against the two locating pins at the left by means of a strap and semi-steel knob *F*, and against the locating pin in the upper portion of the plan view by means of shoulder-screw *G*. It may be noted that the shoulder-screw applies pressure in a direct line with the single locating pin to prevent the work from cocking. Finger slots *H* are provided to facilitate insertion and removal of the part.

The box jig shown in Fig. 6 is a redesigned tool. Among the faults discovered with the original jig were lack of chip space; poor footing when drilling holes in the sides of the part; clamping accomplished by means of two set-

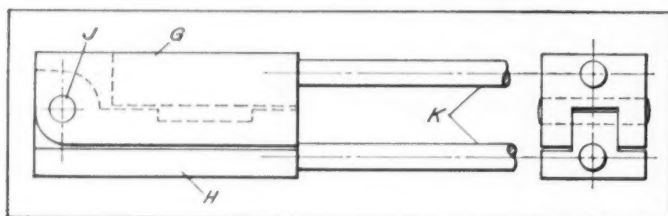
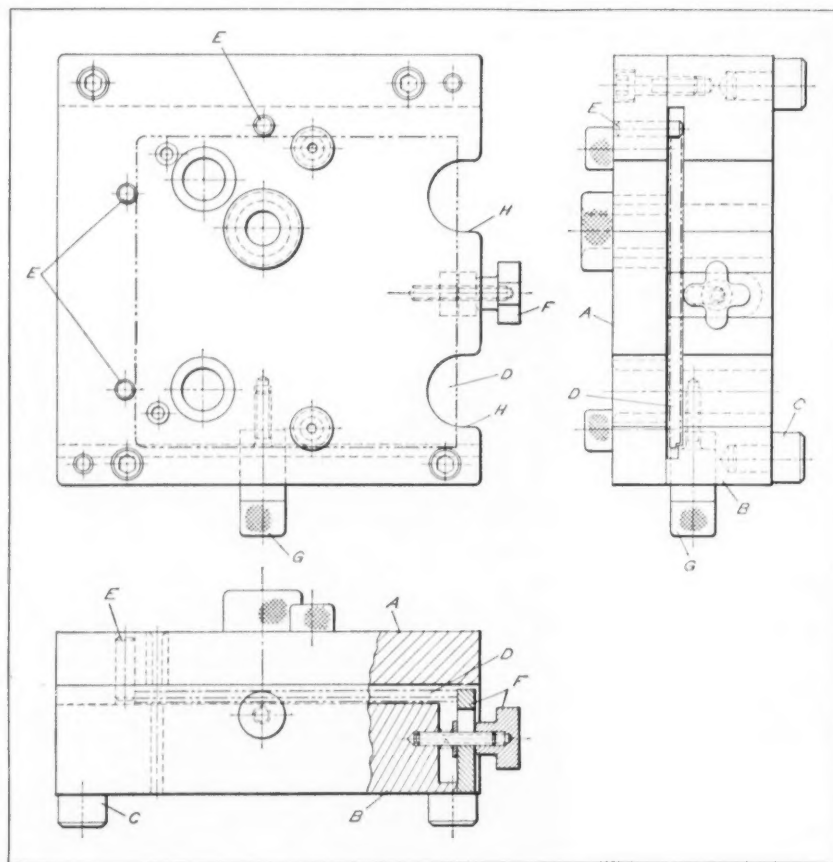


Fig. 4. (Left) Simplified nutcracker jig showing the tongue-and-groove type of construction designed to eliminate side play when the tool is closed. This jig is especially suited for drilling holes that are located from the centers of other holes.

Fig. 5. The body and bushing plate of the drawer type drill jig are screwed and doweled together. Parts to be drilled are slipped into a recess, in the manner of closing a drawer, and locked in place.





screws threaded through the bushing plate; and finally, the difficulty of removing the part. In an attempt to alleviate the last-mentioned item, three finger holes were bored, but they failed to relieve the situation. Redesign of the entire tool was the only alternative.

These shortcomings were satisfactorily met in the improved design illustrated. A leaf, or bushing plate, *J* pivots on two hinge pins *K* to swing out of the way for loading and unloading. Work-piece *L* is then placed in the jig and located on plug *M* and diamond pin *N*. Two strap clamps *O* are slid over the work and tightened in place by knobs *P*. With this system of clamping, no pressure is exerted against the bushing plate. The leaf is then swung down in place over the work and secured by means of a quarter-turn thumb-screw *Q*.

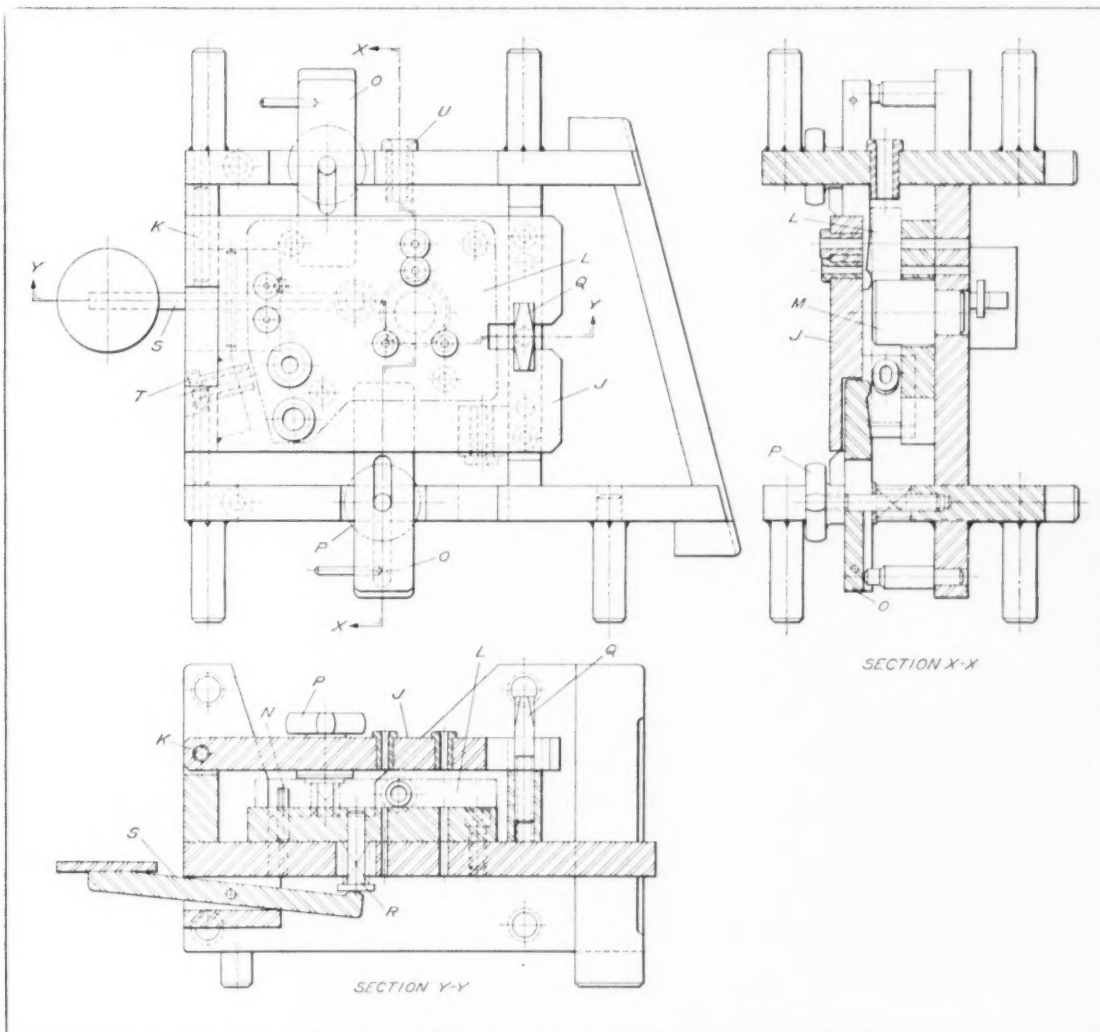
Legs are furnished opposite all sides containing bushings. They are not only sturdy, being press fit and then tack-welded, but they have been spaced far enough apart to prevent tipping. The heads of bushings *T* and *U* are located at equal distances from their respective feet so that the drill stop need not be changed.

An efficient hand knock-out device is provided for part removal. It consists of a spring-loaded plunger *R* and a knock-out lever *S*. The operator merely taps the lever pad lightly with his fist to raise the work-piece from the locating pins. It can then be easily lifted from the jig.

### Ledge Type Drill Jigs

The work-piece seen at *X* in Fig. 7 was originally drilled in a pump jig similar to those previously described. The method proved unsuc-

Fig. 6. A hand knock-out device is incorporated in this box type jig. Bushings are located in a leaf that swings in place over the work and is secured by means of a quarter-turn screw.



cessful in this particular case, however, as the drilled holes were being distorted.

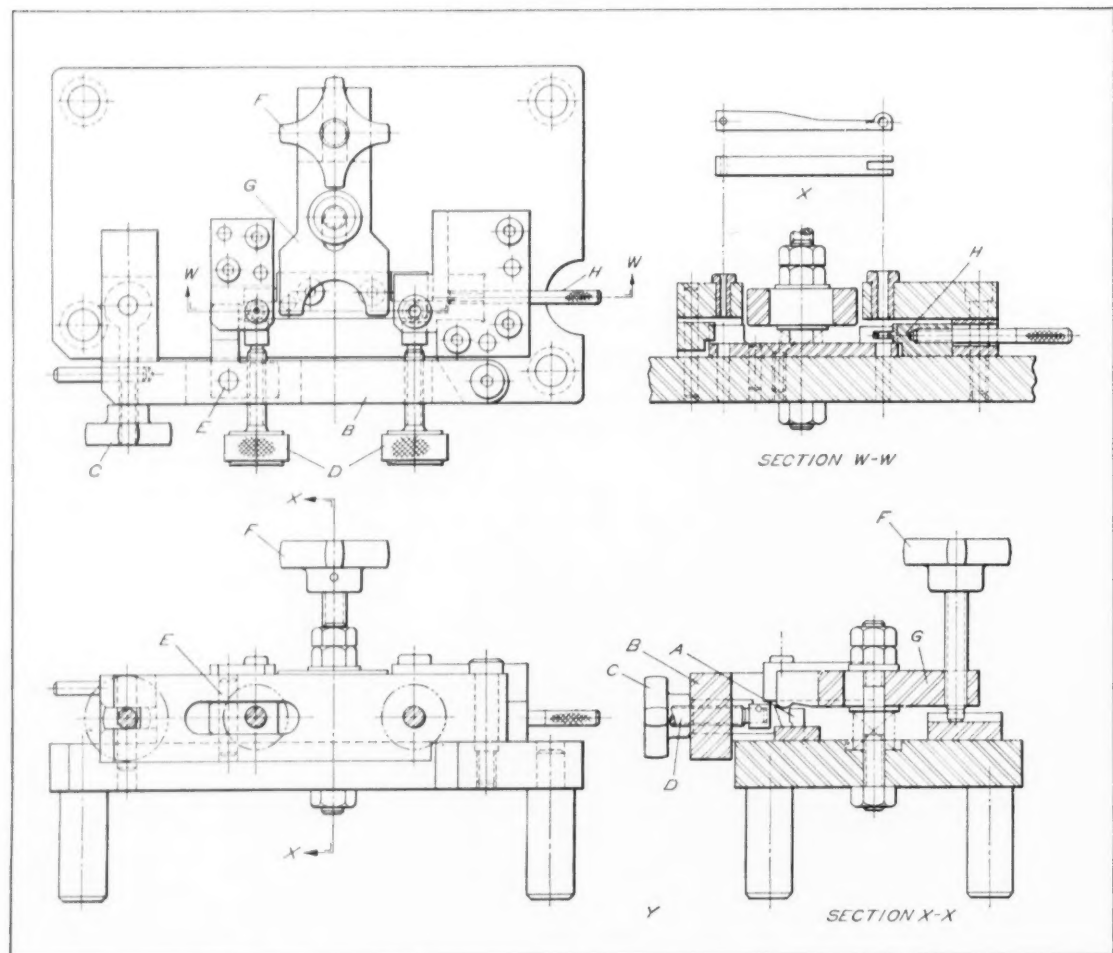
To correct this situation, the ledge type drill jig shown at Y was designed and constructed. With the jig in its open position, the work-piece is inserted from the front against locating ledge A. A swing gate B is then closed and locked by means of swing bolt C. The gate is drilled and tapped to receive two torque-limiting screws D, one of which is mounted on a rocker arm pivoting on pin E. Tightening these two screws forces the part firmly against the locating stops. The left-hand screw, being mounted in a rocker arrangement, also applies a side thrust. Final clamping is done by turning knob F which, in turn, presses strap G down on the top surface of the work.

A floating spacer H, being well guided, is only allowed to move a few thousandths of an inch up or down so that its tongue projects into the

forked end of the part. This is to prevent distortion of the weak section of the part under drilling pressure. Finger slots are provided in the right-hand side of the jig body for ease in gripping the sliding spacer, and in the strap to facilitate unloading. To extend the life of this drill jig, in anticipation of heavy use, the bushings are made of carbide.

Another drill jig of this type may be seen in Fig. 8. The principal features of this design are the quick-acting clamps J and K, and the pneumatic knock-out facilities for work removal. In cases such as this—where there are many holes to be drilled or where the work material is such that a heavy burr is raised as the drill emerges—it is desirable to provide the tool with an air knock-out device as well as chip grooves. The importance of these grooves in facilitating work removal, and thereby reducing the time required per piece, is often overlooked.

Fig. 7. Ledge type drill jig designed with swing gate through which are threaded two torque-limiting screws (D). The screw at the left is mounted in a rocker arm to impart a two-directional thrust against the work.



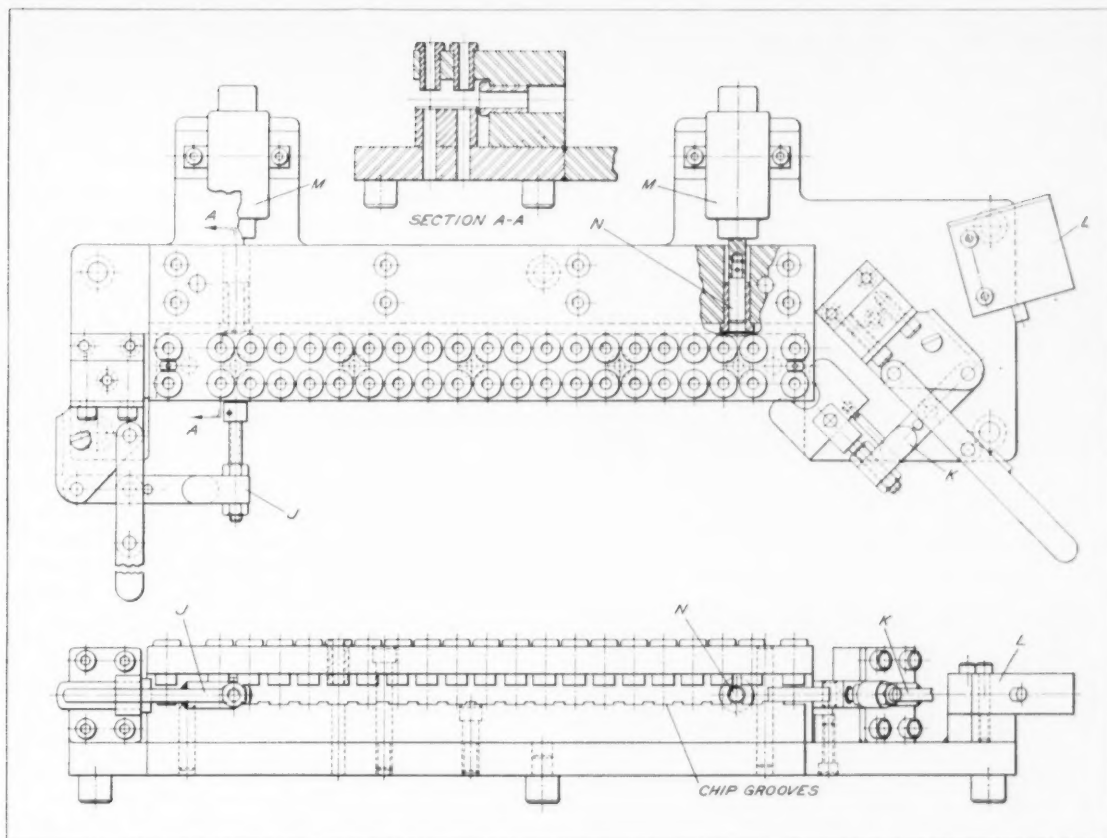
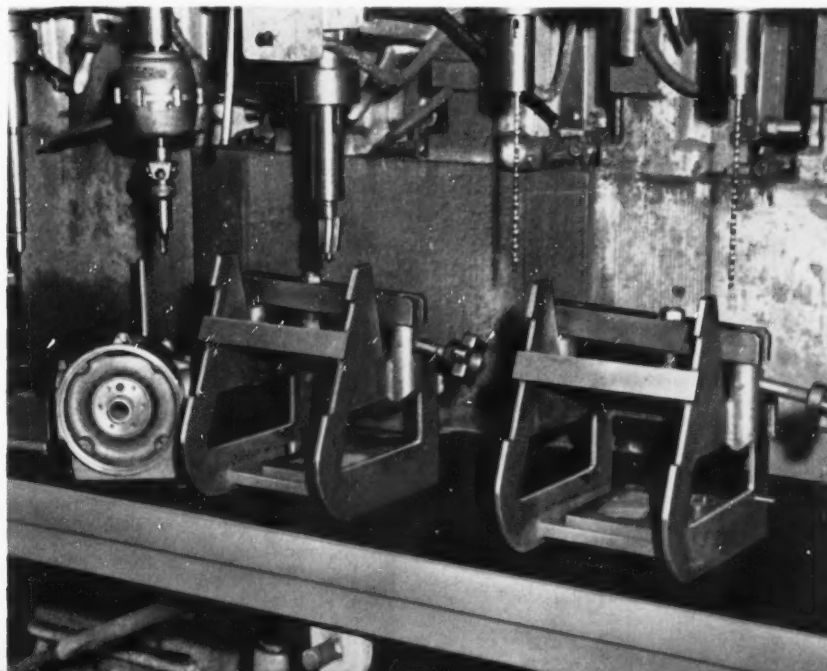


Fig. 8. Ledge type drill jig features quick-acting clamps and pneumatic knock-out facilities.

The heart of the knock-out system is a three-way cam-operated air valve *L*. After drilling is completed, clamp *J* is opened, then clamp *K*. A plunger on the air valve is depressed when the handle of the right-hand clamp strikes it, thus allowing compressed air from the standard

shop supply to actuate the two cylinders *M*. Contact with the work-piece is made by plungers *N*, which are fitted and pinned to the cylinder shafts. It is interesting to note that the hardened steel bushings through which the plungers move serve additionally as locating pads.

Fig. 9. These welded-steel jigs are easy to roll over for drilling holes located in different planes. An additional advantage is their light weight.



### ***Jigs Must be Designed to Meet Many Situations***

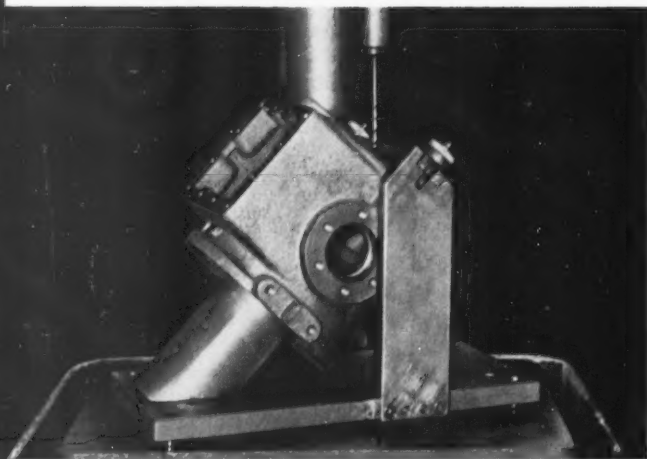
Two jigs that have been designed to facilitate tumbling of the tool for drilling holes located at an angle to each other are shown in Fig. 9. The jigs are strong and rigid, being of welded steel construction. Light weight is an advantage of this type of construction: the part being drilled weighs about 20 pounds while the jig weighs less than 10 pounds.

A simple jig that was designed for drilling an inclined hole through a rather inaccessible boss located within the work-piece is seen in Fig. 10. Two swing eyebolts hold the loose bushing plate in position. A section of pipe is welded to the base of the jig for locating purposes. This also aids in weight reduction.

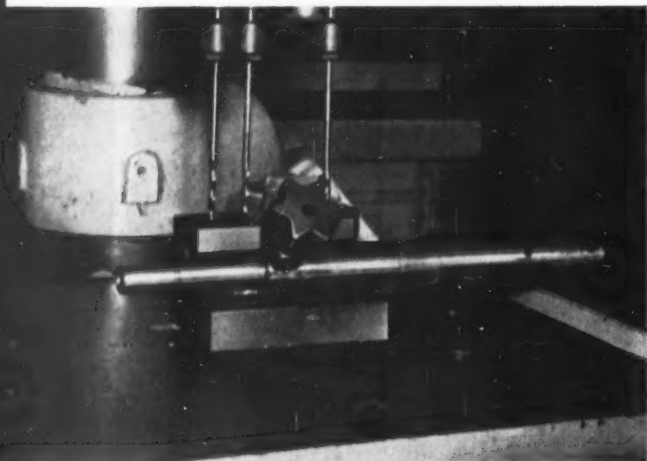
The jig shown in Fig. 11 facilitates the cross-drilling of holes in a motor shaft. A swing-clamp arrangement and a fixed-ledge type bushing guide-plate offer unique construction features.

An angle-plate jig for drilling long oil-holes in connecting-rods for refrigerator compressors is shown in Fig. 12. The work is located on two plugs through which clearance holes have been provided. A swing latch and a knob clamp lock the work securely.

The fundamental requirement of a good drill jig is that it provides for the consistent drilling of holes at specified locations within specified tolerances. The jig should be strong, yet not too heavy or bulky. Also, it should not distort or damage the work-piece. Provisions for rapid loading and unloading are essential. The ability to design practical drill jigs is based on sound engineering principles and shop experience.

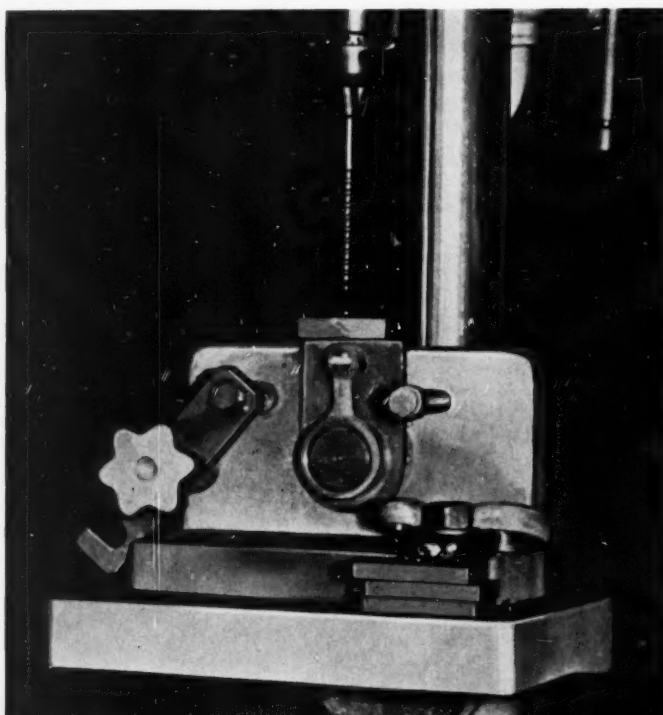


**Fig. 10.** An inclined hole is being drilled through an almost inaccessible boss with the assistance of this simple jig.



**Fig. 11.** (Above) Cross-drilling a motor shaft with a fixed-ledge type drill jig using a swing-clamp arrangement for locking.

**Fig. 12 (Right)** A small angle-plate jig employing a swing latch and a knob clamp is used for drilling long oil-holes through a connecting rod. Two plugs locate the work-piece.





Tools and fixtures of unusual design and time- and labor-saving methods that have been found useful by men engaged in tool design and shop work

## Split-Jaw Chuck Locates Work Positively

By WILLIAM C. BETZ, New Britain, Conn.

Positive work location for the accurate cutting of internal or external grooves, shoulders, or threads may be obtained with a special nest type chuck. This chuck, shown in the illustration, consists primarily of four spring-loaded jaws contained within a one-piece outer shell.

Cylindrical block *A* is bored and threaded at one end for securing it to the lathe spindle. A hole large enough to allow ample longitudinal movement of pin *B* is drilled diametrically through the block. This pin passes through a hole in bar *C* and extends into the outer shell *D* at both ends, where it is retained by means of two set-screws *E*. In this way, any movement by bar *C*, either backward or forward, will cause the same movement in the outer shell.

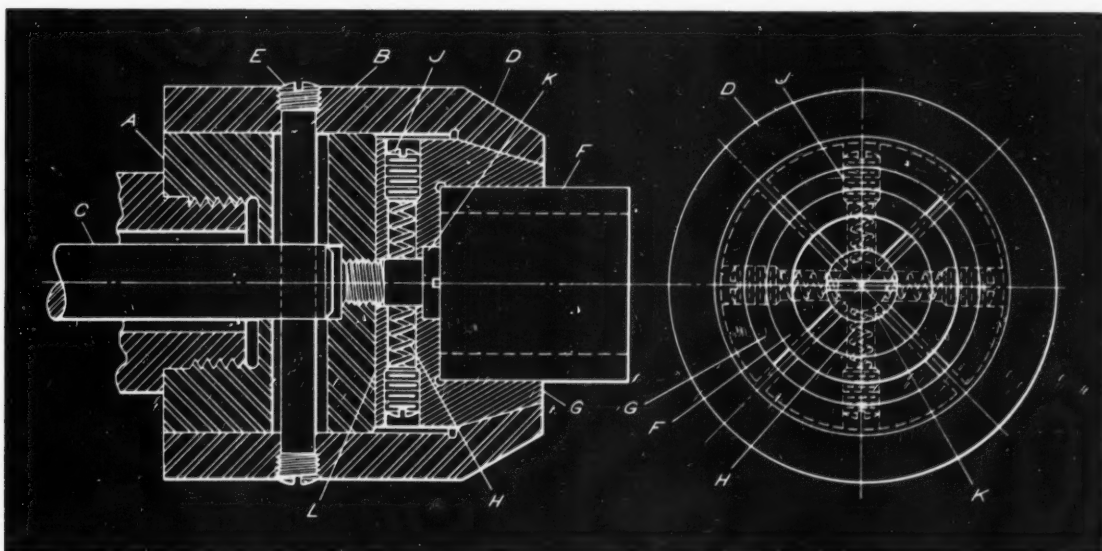
Work-piece *F* is held by four split jaws *G*. Each jaw segment is drilled, counterbored, and tapped to receive spring *H* and set-screw *J*. The springs bear against the machined surface of

shoulder-screw *K* which is threaded into the outer face of the cylindrical block. Two purposes are served by this screw. First, it furnishes a surface against which the jaw springs may exert pressure. Second, and perhaps most important, the shoulder of the screw retains the jaws against the face of block *A*.

With the springs in a fully compressed position, the outside diameter of the jaw-body assembly must be smaller than the inside diameter of the outer shell. This is done so that the jaws will have room to expand when the chuck is released.

The front taper on the jaws match the inside taper of the shell. Grinding and lapping operations are utilized in fitting shell *D* to block *A*. Best results were obtained by making the parts from a low-carbon oil-hardening steel which was carburized to 60 Rockwell C. A penetration ranging from 0.040 to 0.050 inch is desirable.

To load the chuck, bar *C* is pushed forward by either a lever mechanism or an air cylinder, thereby moving the shell forward and releasing the jaw assembly. The springs *H* will then open the chuck so that the work-piece can be inserted



Spring-loaded jaws of this nest type chuck accurately locates work-piece.

in the jaws *G* which are banked against the vertical surfaces *L*. Then the bar is retracted, pulling the shell back. When the internal tapered portion of the shell contacts the tapered section of the jaws, they will close firmly on the part. From this it may be seen that each and every work-piece will be banked from the same spot. Another advantage of this set-up is the fact that parts can be changed without stopping the machine.

Changing the chuck jaws is accomplished by removing set-screws *E* and knocking out pin *B*. Outer shell *D* may then be slipped past block *A* and the jaws removed. Inserting new jaws merely requires reversal of this procedure.

### Collet Type Fixture Indexed by Means of Template

By W. M. HALLIDAY, Southport, England

A quick-acting milling fixture that incorporates a replaceable template for indexing purposes, and a standard split collet for gripping the work-piece, is here illustrated. This fixture was designed to simplify setting up, indexing, and milling an accurate seven-sided polygon on the small steel shoulder-stud shown at *A*. Because it is designed for using interchangeable collets, the fixture is widely applicable.

The cast-iron body *B* is bored longitudinally to receive a ground sleeve *C*. A tolerance of plus or minus 0.0005 inch is held on the dimension between the axis of the bore and the machined mounting face on the under side of the body casting.

Fitting the sleeve is a standard split collet *D*. The left-hand end of sleeve *C* is bored to

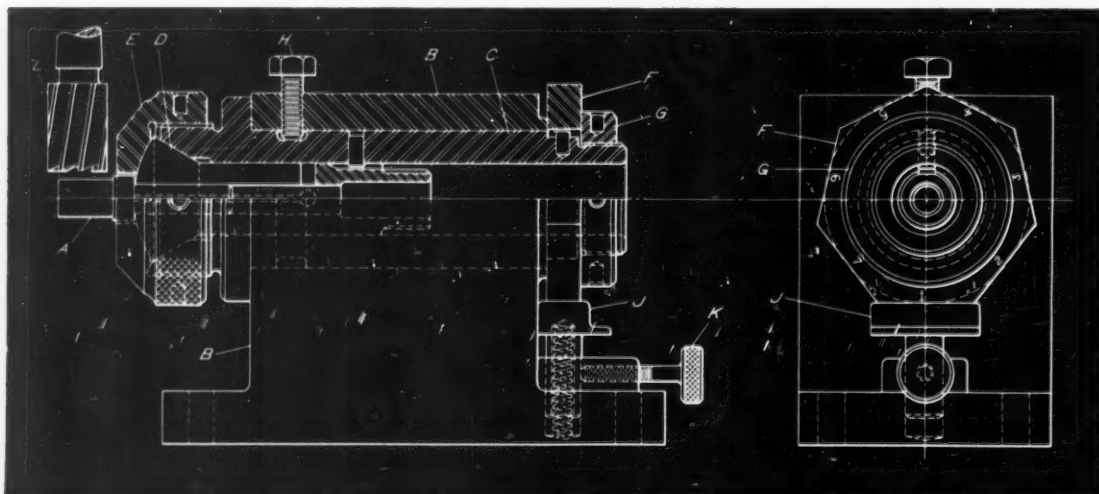
match the side taper on the conical head of the collet. A pin, pressed into the ground sleeve, projects into the bore sufficiently to engage a keyway provided in the shank of the collet, thus preventing rotation between the two members.

Casehardened steel locking-cap *E* is threaded internally to engage threads on the extreme left-hand end of the ground sleeve. This cap is knurled on its outside diameter and provided with four equally spaced holes for a spanner wrench. The inside end-wall of the cap is domed to the same curvature as the collet head against which it bears. A clearance hole is drilled through this same end-wall so that the longest shank of the work-piece may be passed through it into the jaws of the collet.

The right-hand end of sleeve *C* projects from the body casting, and is machined to provide a bearing surface for template *F*. This template is a push fit on its bearing surface and is restrained from turning by means of a pin and keyway.

In this case, the perimeter of the template is accurately formed with seven equal sides, as shown in the side view at the right in the illustration. The template is made six times larger than the corresponding polygonal shape required on the work-piece. This enlargement not only simplifies manufacture but also promotes greater accuracy in the finished product. The completed template should be casehardened and, preferably, lightly ground on all sides to insure flatness. Circular lock-nut *G*, having spanner holes in its rim for tightening, holds the template in place.

Sleeve *C* is locked within the body at each of the required seven radial settings by means of set-screw *H*. The tip of this screw is hardened, and extends into a shallow annular groove cut around the periphery of the sleeve. By allowing



Milling fixture that accepts interchangeable collets is indexed by means of replaceable templates.

the screw to bear down on the base of this groove, resulting burrs, or flats, which are likely to arise from repeated gripping, will have no adverse effect upon the continued smooth working of this sleeve.

The sleeve, and all members mounted thereon, are indexed within the body to the desired seven positions by means of the T-shaped slide *J*. This slide has a rectangular head which is appreciably longer than the various sides of the polygonal template. The cylindrical shank of the slide is machined to a medium fit within its mating hole in the body. A compression spring, which is located within the hollow vertical leg of the slide, forces it upward and in contact with the flats on the template.

The surfaces of the rectangular head of the slide are carefully ground for flatness and squareness. It may be observed that the long, rear side of its head is in sliding contact with the vertical side of the body. Fitting the slide in this way prevents the member from turning when lock-screw *K* is released.

In use, the fixture is bolted to the table of a vertical milling machine. Template *F* is set so that one of its flats is flush against the top surface of spring-loaded slide *J*, following which lock-screw *K* is secured. Set-screw *H* is then tightened securely so that the sleeve is located in the position.

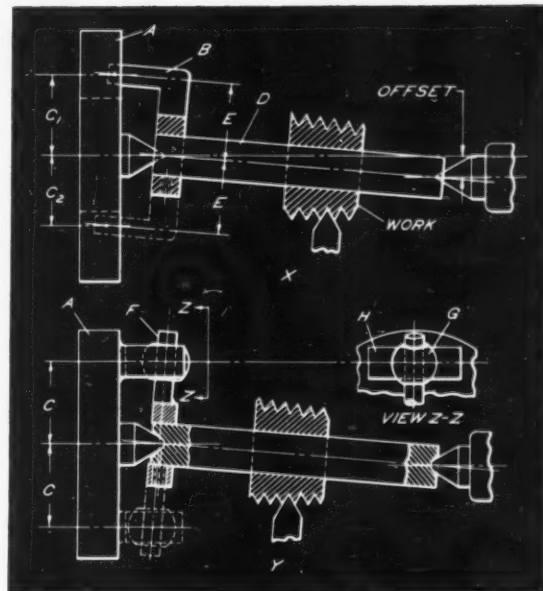
The work-piece *A* is inserted through the clearance hole in the locking cap, into the jaws of collet. To grip the work-piece, the locking cap is rotated clockwise. This action forces the collet farther into the sleeve, thus causing the jaws to close on the work. A small end-mill *L* is used for the machining operation.

### Sliding Dog for Offset-Tailstock Turning

By OLIVER SAARI, Schiller Park, Ill.

Offsetting the tailstock is still a common method of providing the desired angle for the work in turning small tapers on a lathe. Ordinarily, no attention need be paid to minor variations in angular velocity of the work due to the action of conventional driving dogs. When cutting tapered threads or relieving tapered cutters, however, the use of a standard lathe dog can introduce serious errors.

Cyclic changes in angular velocity of the work in an ordinary set-up are caused by slippage in the coupling between drive-plate *A* and dog *B*, as shown at *X* in the illustration. The drive-plate rotates at a constant speed, but the work does not. In the position outlined by solid lines,



Ball type sliding dog reduces errors normally encountered when using conventional lathe dog during taper-turning with offset tailstock.

the velocity of the drive-plate at radial distance  $C_1$  is imparted to the dog. From here the motion is transmitted to arbor *D* at a distance *E*.

In the alternate position, indicated by broken lines 180 degrees away, the drive-plate velocity at distance  $C_2$ , obviously quite different from  $C_1$ , acts on the arbor at the same distance *E*. Thus the work-arbor does not turn at a constant velocity, its speed ranging from  $C_1/E$  to  $C_2/E$  times the drive-plate speed. Since the carriage lead-screw turns at a constant ratio to the drive-plate, a "weave" will be produced during the cutting of tapered threads, and an out-of-round condition in relieving tapered cutters.

A special driving arrangement and arbor, such as those shown at *Y*, will help to alleviate these errors. The arbor is mounted on spherical centers so that the exact pivot points are known. The driving dog has a ground pin *F*, the axis of which passes through the live-center pivot point. A section of a hardened steel ball *G* is mounted with a sliding fit on the pin. The outer surface of the ball fits within a partial hole machined in arm *H* which is attached to the drive-plate. This spherical drive connection always remains a constant distance *C* from the drive-plate axis of rotation. The distance from the spherical drive connection to the work-arbor axis varies by the cosine function of the taper angle, changing through two complete cycles with each revolution. Therefore, the angular velocity of the work-arbor does vary slightly, but the variation is less than that of the conventional set-up shown at *X*.



# Machine Tool Builders Meet in Chicago

**T**HE "peaks and valleys" traditionally characteristic of the machine tool industry need no longer be considered inevitable, contended Herbert L. Tigges in his opening address, "A Year of Decision," at the fifty-second spring meeting of the National Machine Tool Builders' Association. This was held at the Edgewater Beach Hotel, Chicago, Ill., May 5 to 7. Mr. Tigges is president of the Association and executive vice-president of Baker Brothers, Inc. "We may not be able to straighten out the business curve completely," he said, "but we can certainly turn out a performance record that will look less like a cross-section of the Rocky Mountains and more like the central plains."

Mr. Tigges listed five favorable factors existing in combination today that provide a unique opportunity for the long-term stabilization of the industry: a continuing high level of industrial production; the greatest accumulated obsolescence of metal-working equipment in history; a competitive situation among machine tool users that is bound to make them extremely cost-conscious; a recognition of National Defense requirements as a continuous, not emergency, activity; and a more understanding attitude on the part of the Government than in previous years. Expanding on the subject of obsolescence, he claimed that machine tool builders must speed up their rate of redesign to parallel the rapid pace of product redesign today so prevalent in industry.

Tell Berna, general manager of the Association, expressed the hope that the Senate Appropriations Committee would see fit to restore the \$250,000,000 intended for the purchase of production equipment by the Department of Defense under the Vance Plan. Mr. Berna cautioned the machine tool builders to familiarize themselves with the costs of shielding and testing equipment for radar and radio interference when such a specification is contained in a Government bid.

In considering the matter of improving government relations, Milburn A. Hollengreen, first vice-president of the Association and president of the Landis Tool Co. and Gardner Machine Co., proposed that members make an effort to become better acquainted with their congressmen on Capitol Hill. Approaching them with regard to problems of the industry on an uninformed, conversational level, however, should be avoided.

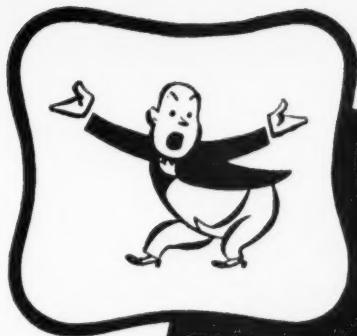
Mr. Holengreen stated it was almost equally important to have close relations with the top officials in the executive branches and agencies of the Government. He also stressed the desirability of having members act in concert through the offices of the Association on policies and programs of common interest.

The subject of public relations was reviewed by Louis Polk, second vice-president of the Association and president of the Sheffield Corporation. Laymen who mold public opinion, as well as potential equipment buyers, should be shown how machine tools not only reduce costs, but create jobs and raise living standards. Educating the public, Mr. Polk said, is a never-ending process.

The Procurement Policy Sub-committee of the Government Relations Committee claimed that its proposals regarding uniform prime contracts for machine tools that were presented to Defense Department officials last October have been studied most thoroughly in the Pentagon. Sub-committee member Alan C. Mattison, president of the Mattison Machine Works, read the report in the absence of the chairman, Charles S. Davis, Jr., vice-president of the Lake Erie Engineering Corporation. The report further stated that it appears likely that some agreement may be necessary upon collateral specifications covering such items as painting, packaging, and instruction manuals.

A paper read by Ralph S. Howe, president of the New Britain Machine Co., in his capacity as chairman of the Sub-committee on Permanent Defense Capacity, recounted the Sub-committee's activities in opposing the leasing of government-owned machine tools. Mr. Howe stated that from the tenor of a Sub-committee visit with the Assistant Secretary of the Army, assurance was given that every attempt was being made to adhere to Order VII-4 issued by the Director of Defense Mobilization, Dr. Arthur Flemming, in October, 1953. This prevented leasing except for the production of military items and defense-supporting projects. At present, the Sub-committee is studying the validity of the criteria used to screen machines that are to be sold at auction. Many machines, it is felt, that were critical during the Korean build-up, are being sold prematurely, before making a thorough analysis of their value as reserve equipment.





# The Sales Engineer and His Problems

By BERNARD LESTER  
Management Consulting Engineer  
New York

## Do We Depend Too Much on Props?

**I**N the deep South, many people were recently concerned because a 400-year-old tree was cut down to make room for a ranch house with a television antenna. The tree had deep roots and a massive trunk, but the slender antenna could pierce the sky only while supported by guy wires. Haven't some sales engineers today become more like the slender antenna surrounded by props and less like the tree able to stand alone?

Most machinery, tooling, and equipment manufacturers are continually supplying more and more sales props to their salesmen. Advertising and sales promotion to create customer acceptance; technical specialists and service engineers to handle troubles; and sales training courses to show how to make use of all of these sales helps.

The importance of such sales aids should not be discounted, but on the other hand they should not weaken our ability to stand alone. A very live subject in connection with organized selling is whether the multiplication of sales aids is inclined to hinder our individual growth, and tempt us to be only messengers of good will, ready to pass the buck to others.

In today's mechanical age, "sweat, blood, and tears" are spent to preserve individual freedom. Yet there is a great tendency—at least in selling—to substitute formulas for well grounded ingenuity, and rules for individuality. Success in selling is more and more inclined to follow a pattern set by headquarters.

The taller some of us grow, like the antenna, the more we depend on props. A real storm could fell us in a tangled mass. That is why "three-dimensional" growth is vital. The skill to rise and determine circumstance, in place of circumstance controlling us, is based largely upon erudition in the spheres of business, technical development, and human activity. These are the roots.

Let us consider the following spheres for three-dimensional growth, and cite a few scattered examples to pin-point what we mean:

1. Are we steadily becoming better informed about the changes in industry, particularly the industrial environment that concerns us most?

Examples:

Economic forecasts—direction and extent of probable change

Prices of materials, such as metals and plastics, directly affecting our market

Corporate organizational changes influencing potential sales

Legislative action on depreciation and corporate taxation

Changes in the export and import situation

2. Are we cognizant of significant technical developments affecting the products and processes of our prospects and customers?

Examples:

The pros and cons of automation

Substitution of plastics for metals

How about ultrasonic developments?

Will investment castings encroach on forging, machining, and stamping?

What's new in the measurement of tolerances, gaging, and automatic inspection?

3. Are we getting a better understanding of the changing relationship between people—their attitudes and behavior—including specific customer personnel? Many companies today are actively evaluating personnel, spotting likely young men for advancement.

Just recently we listened to a purchasing engineer talk to a group of sales engineers. Above all, he explained, constantly greater consideration was being given to three-dimensional sales engineers, those who were better informed on industrial progress, new technical practices, and an understanding of human affairs. He deplored the sales engineer who depends only on selling props, and likewise the sales engineer who fails to use them. He preferred the "sales engineer who carries a basket full of ideas, rather than an empty one to be filled with orders."

## LATEST DEVELOPMENTS IN

# Shop

### Precision Turning and Grinding Machine Developed for Jet-Engine Work

A precision turning and grinding machine developed especially for the jet-engine industry, but applicable to any work on which exceptionally close tolerances are required for concentricity and parallelism of turned and ground surfaces, has been announced by the Frauenthal Division, Kaydon Engineering Corporation, Muskegon, Mich. This Series 3100 machine is designed to perform multiple turning or grinding operations in one set-up. It is made in four table sizes—36, 42, 48 and 52 inches—all with a 69-inch swing.

Power for driving the table is provided by a 10-H.P. direct-current unit, with power transmitted to the table spindle through

a "timing" belt. The work-spindle pulley is ball-bearing mounted in a heavy housing. All radial loads on the pulley are taken on its own bearings, and are not transmitted to the table spindle.

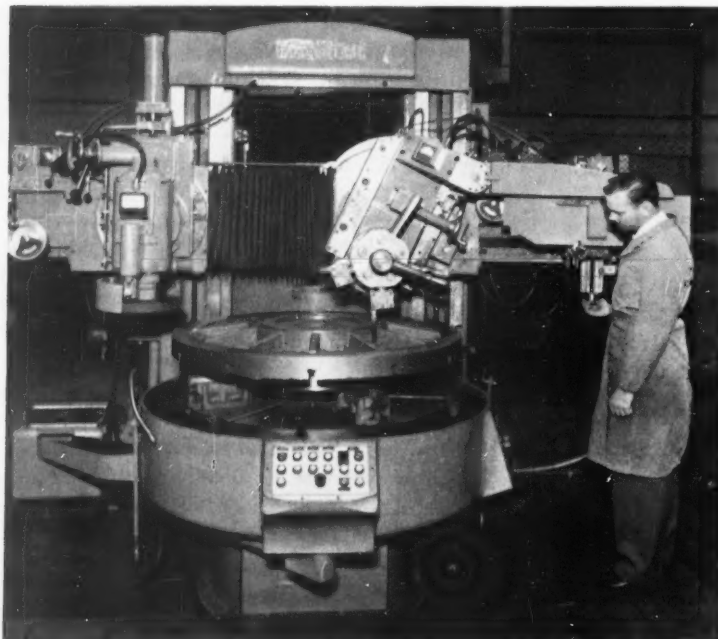
The right-hand saddle, or compound, carries a hydraulically actuated turret-slide equipped with a cam-locking, manually rotated five-station tool turret. This turret-slide can be rotated 45 degrees either side of the vertical position.

The left-hand compound is equipped with a direct-connected, self-contained grinding spindle and is capable of an 8-inch hydraulically actuated vertical stroke, and in addition a manual adjustment of 4 inches. The maximum

angle setting of the compound is 45 degrees either side of the vertical. The grinding spindle itself can be swiveled through an angle of 180 degrees.

The direct-current drive provides infinitely variable, electronic potentiometer-controlled table speeds up to 175 R.P.M., or in higher speed ranges if required. Dynamic braking of the table and jog button control are standard equipment. All horizontal and vertical feeds are hydraulically actuated to provide infinitely variable feed rates. Controls for horizontal and vertical feeds are grouped at either end of the cross-rail, with all other controls located in the central panel.

The machine is adapted for tool and die work, and is particularly well suited to experimental departments in large manufacturing plants. Optional equipment has been designed to cover a wide range of work, from production operations to job shop requirements. A variety of grinding spindles are available which can be substituted for the direct-connected spindle furnished as standard equipment. These include belt-driven and other type spindles for small-bore or deep-hole grinding. Hydraulically actuated straight, radius, and combination radius-angle dressers are available and special dressers can be furnished. Also available as optional equipment is a constant surface feet-per-minute control, which is an electronic device that automatically adjusts the table speed to maintain a constant surface speed when taking wide facing cuts. This control is also used in conjunction with the hydraulic tracer attachment for contour turning. The hydraulic duplicator may also be used as a sizing device for repetitive turning. .... 101



Frauenthal precision turning and grinding machine for jet-engine work

# Equipment

Machine tools, unit mechanisms, machine parts, and material-handling appliances recently placed on market

Edited by FREEMAN C. DUSTON

## Hammond Grinder-Polisher Using Abrasive Belts

A space-saving abrasive belt grinder-polisher brought out by Hammond Machinery Builders, Inc., Kalamazoo, Mich., has the mounting structure for the abrasive belts attached to the base of the polishing lathe. This permits tilting the abrasive belts upward instead of to the rear of the machine, thus reducing the amount of floor space occupied. Abrasive belts up to 14 feet long can be

used on this machine. The polishing lathe illustrated is the variable-speed Model VRO, with a range of 1500 to 3000 R.P.M. The

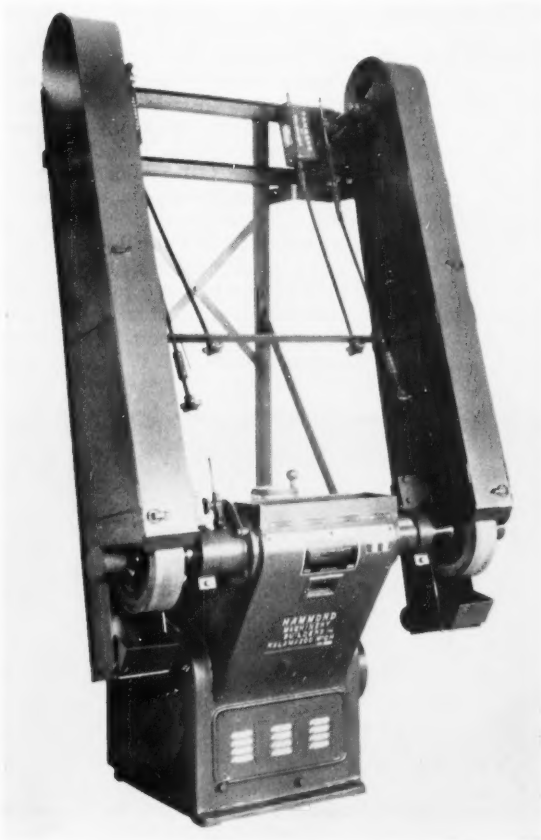
back-stands can be either spring- or air-tensioned, an arrangement that can be furnished with most Hammond polishing lathes. . . 102

## Lapointe Double-Ram Vertical Broaching Machine with Electromechanical Drive

The Lapointe Machine Tool Co., Hudson, Mass., has just announced a vertical broaching machine with an electromechanical drive. Although primarily designed for high-production broaching of large

aircraft engine turbine buckets, this double-ram machine is readily adaptable to the mass production of many other parts requiring surface broaching.

Speeds are varied by turning a



Hammond abrasive belt grinder-polisher

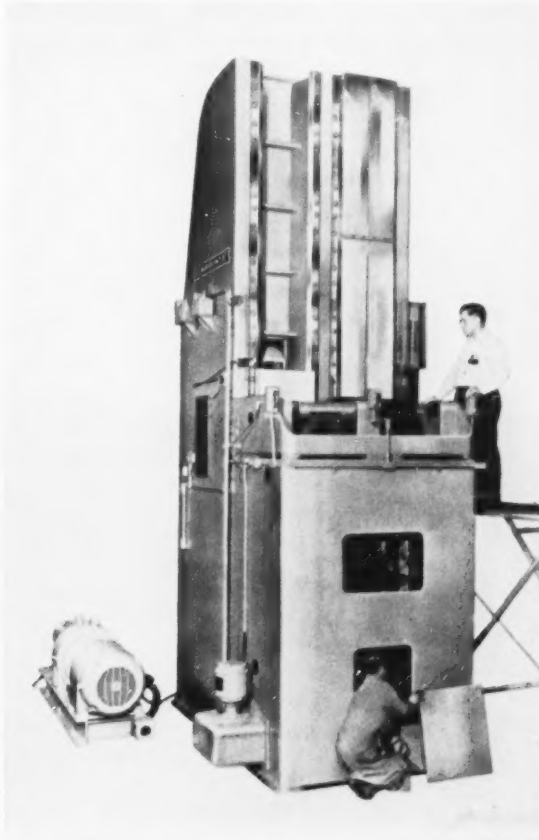


Fig. 1. Lapointe double-ram broaching machine



Fig. 2. Bucket of S-816 steel broached on machine illustrated in Fig. 1

knob on the side of the machine. The electromechanical drive with a constant torque variable-speed direct-current motor is through a double gear-box, and has a positive lock between the two rams. The main drive is of the continuous tooth herringbone gear and rack type. The second reduction is through helical gears, and the third reduction is through a spiral bevel gear coupled through a direct-current motor.

The exceptionally smooth operation of this machine at high speeds is said to be due to the ample weight of the machine, the built-in rigidity, and the drive. Advantages resulting from its smooth broaching operation include an increase in tool life; a substantial saving in "down" time, which would otherwise be caused by ex-

cessive tool change-overs; and the production of very accurate work having a fine finish.

The illustration shows this massive broaching machine in the process of assembly. Its weight is in excess of 30 tons, without tools. The slides are unusually heavy—20 inches wide and set on 30-inch centers. The ways are lined with natural phenolic. Strokes of 70 to 100 feet are available, using a motor of the horsepower suited to the job.

### Precisionaire Bore and Multiple-Dimension Gages

A Precisionaire gaging assembly designed to inspect two internal bore diameters and their concentricity in an automobile transmission extension housing is announced by the Sheffield Corporation, Dayton, Ohio. The assembly of gaging equipment, Fig. 1, consists of a three-column Precisionaire connected to a 5-inch gaging spindle, which is mounted on a serrated steel base, and a hand type air spindle. The air spindle has a capacity for measuring a hole approximately 2 inches in diameter at the top of the part.

The part to be gaged is lowered over the locating shaft so that it rests on the base. The gaging spindle is then inserted in the top of the part. The float positions instantly in first two columns in the Precisionaire showing whether the part is within tolerance specifications or the amount that each diameter is out of tolerance. Eccentricity is indicated by float fluctuation in the third column as the part is rotated through an angle of 360 degrees.

The Lapointe tip-down type work-table is a special feature of this machine. It is easy to load and unload, and is designed to minimize operator fatigue. The machine is equipped with hydraulic units for the fixture, table, and clamps. The automatic lubricating system shuts off the machine if the oil level gets too low. The coolant pump and motor unit is mounted on the side of the machine, in a convenient position for inspection and servicing. . . . 103

The Sheffield progressive type air gage, Fig. 2, for inspecting five dimensions on an oil-pump body consists of three air spindles and a five-column Precisionaire. A special spindle, shown at the left, has a single "Balljet" at the top which checks the depth and parallelism of the inside surface of the oil-pump body. Depth is indicated by the float position in the Precisionaire column, and parallelism is shown by the float variation as the part is moved around the spindle.

The other two air spindles gage a bore diameter, radius, and concentricity of the bore with the radius. Each is connected to two air columns that are identical except that one is for a bore size 0.007 inch larger than the other. A single jet in the large diameter of the spindle checks the radius and is also used in conjunction with a jet in the smaller diameter for checking concentricity as the part is rotated. A set of jets in the smaller diameter is used for checking the bore size of the work being tested. . . . 104



Fig. 1. Assembly of Precisionaire gaging equipment for inspecting two bore diameters in automobile part

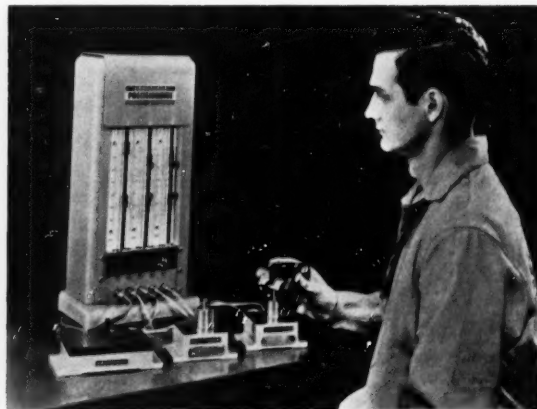


Fig. 2. Sheffield progressive type air gage for inspecting five dimensions of oil-pump body



## Kodak Contour and Surface Projector with Large-Size Viewing Screen

A contour and surface projector featuring a 30-inch viewing screen has been brought out by the Eastman Kodak Co., Rochester, N. Y. This Model 30 projector, Fig. 1, is intended for use both in precision micrometry and on the production line. In either of these fields, its size is said to permit easier inspection.

Features of the projector include a choice of either shadow or surface illumination; operation in ordinary room light; instant changes in magnification without re-focussing; and an unvarying 8-inch distance between the lens and plane of the object observed.

The light paths for either shadow or surface projection are shown diagrammatically in Fig. 2. The light path for shadow projection is: light source (1); collimator (2); object inspected (3); front mirror (4); relay lens element (5); mirrored stop (6); relay lens element (7); projection lens (8); main mirror (9); and viewing screen (10).

The light path for surface projection is: internal light source (11); surface collimator (12); mirror (13); relay lens element (5); front mirror (4); and object inspected (3). Light reflected from the object returns through the optical system as described in Steps 3 to 10 for shadow projection.

In addition, the new model offers a staging area with a 17-inch throat; 8-inch horizontal and 8-inch vertical table travel; a built-in helix table with a work-table rotation of 15 degrees off center in either direction for setting helix angles; horizontal and vertical micrometers which are guaranteed accurate to 0.00005 inch over their entire 1-inch range; a direct-reading screen for angular measurements which can be read without vernier from a dial calibrated to 2 minutes of arc; and a built-in 1500-watt light source for the surface inspection of cavities, blind holes, and surface details with the Kodak normal surface illuminator.

Illumination for shadow projection is provided by a 500-watt light source which gives a sharp screen image. The projector is available with a choice of six interchangeable lenses from 10X, to 100X, any of which may be mounted in a motorized turret to

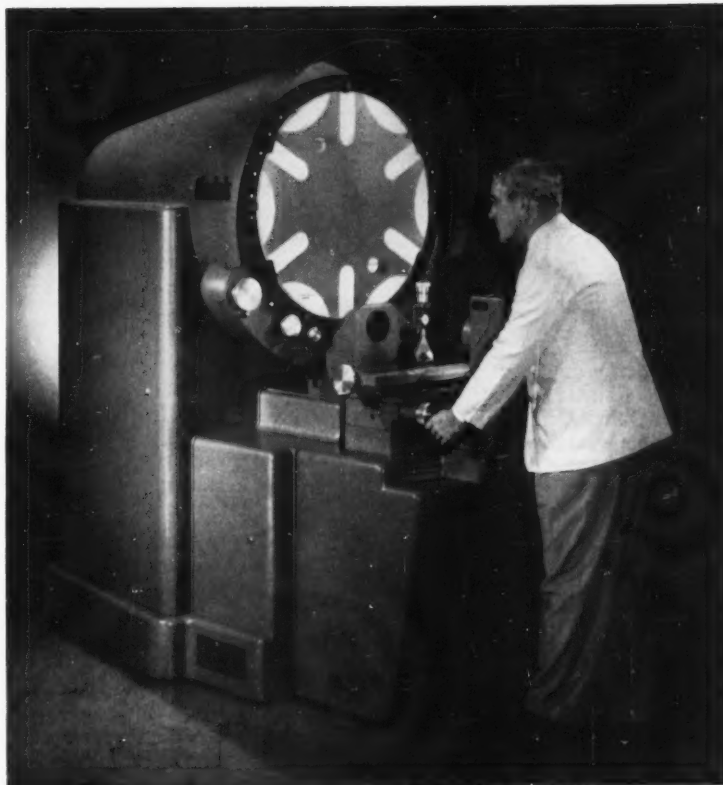


Fig. 1. Kodak contour and surface projector with large-size screen

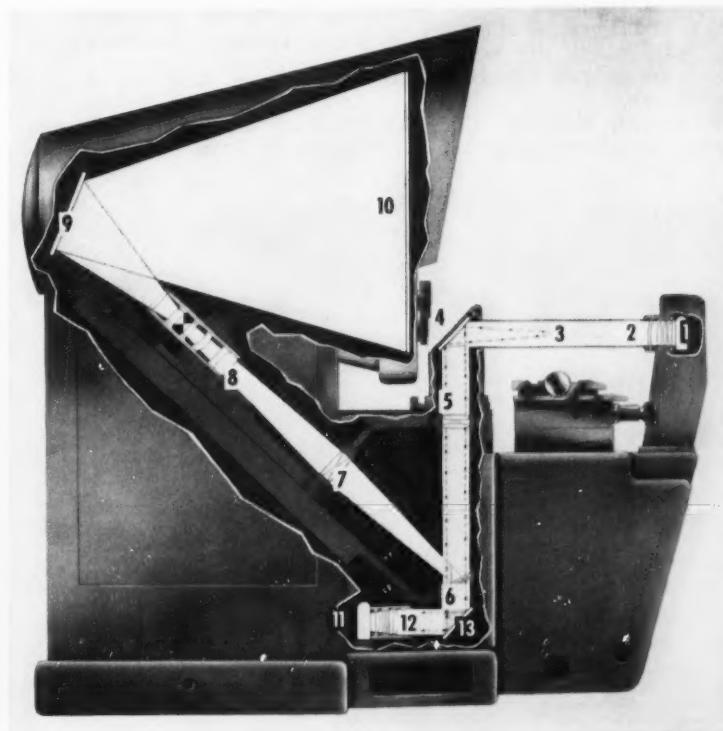


Fig. 2. Diagrammatic illustration showing light paths of Kodak projector for either shadow or surface projection

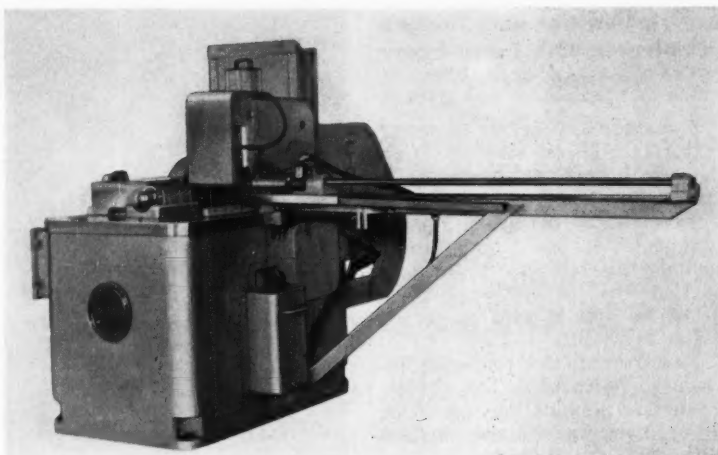
provide instant change of magnification. No focussing or other adjustment is necessary when magnification is changed. Projection lenses and mirrors are both mounted on a single member. This provides maximum rigidity and alignment for these critical parts even under shop conditions. . . 105

### Grieder Tube Cut-Off Machine

Steel tubing can be cut at a speed of 6000 cuts per hour with a tube cut-off machine manufactured by Grieder Industries, Inc., Toledo, Ohio. A new principle of tube cutting is incorporated in the design of this machine, two special blades being used. One blade operates in a horizontal position, and the other in a vertical position. These blades can be used for thousands of cuts before resharpening is necessary. The machine is designed to cut tubing of any shape and diameter up to 2 inches in ordinary wall thickness. It will cut steel, copper, brass, aluminum, stainless, and various other metal alloy tubes.

Operation of the cut-off machine is fully automatic with a feed rate of 600 feet per minute. The tube cutting speed of the machine is regulated by the gear ratio and is capable of cutting up to 6000 pieces per hour. Cuts made are accurate in length within 0.002 inch.

Precision clamping dies that hold the tubing during the one-



Tube cut-off machine manufactured by Grieder Industries, Inc.

third of a second cutting time prevent any distortion of the tube and at the same time reduce the burr to a minimum. In most cases, the cut-off tubing can easily be put over a mandrel for further manufacturing operations. The dies are quickly interchangeable for various tubing sizes. An air-operated combination clutch and brake unit is provided. . . . . 106

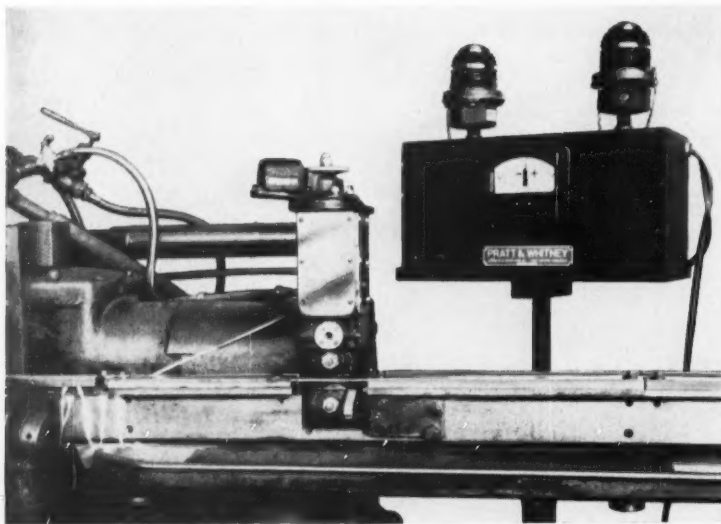
### Electrolimit Continuous Gage for Centerless Ground Bar Stock

Developed originally for cold-rolling mills, the Model D Electrolimit continuous gage introduced by Pratt & Whitney Divi-

sion Niles-Bement-Pond Co., West Hartford, Conn., can now be applied to centerless grinders for the continuous gaging of precision ground bar stock.

The application of this gage to through-feed bar grinding work provides continuous control of the accuracy. With the addition of control circuits to the gage, an off-tolerance signal can be furnished to shut down the machine, signal the operator, or apply feedback impulses for controlling the machine automatically, provided the machine is designed for such controls. The instrument shown in this application is the "Light Signal Control," which utilizes the contact meter to provide the signal. Other Pratt & Whitney control units are also available.

The Model D is a direct-setting, measuring gage employing a counter for making settings directly to 0.0001 inch and a meter for reading plus and minus deviations from the setting to 0.0001 inch. The Model D is adaptable to any 1/2-inch range, such as 0.2500 to 0.7500 inch or 0.5000 to 1.0000 inch, by means of an easily made change. . . . . 107



Pratt & Whitney gage adapted to continuous gaging of precision centerless ground bar stock

### Comproil Compressible Liquids

Wales Comproils, which are compressible liquids intended for use in Wales Hydra Springs, have just been made available for other applications by the Hydra Spring Division of the Wales-Strippit Corporation, North Tonawanda, N. Y. One of the widest uses of Wales Comproils is in cushioning applications. They also have vari-

ous uses in hydraulic systems. Three Comproils designated 62, 100, and 118 are available. These Comproils have compressibilities

of approximately 6.2, 9.6, and 11.75 per cent, respectively, at a pressure of 20,000 pounds per square inch ..... 108

### "SlideHoning" Precision Tumbling Machine with Multiple-Barrel Equipment

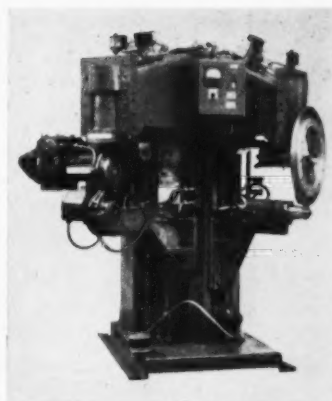
A new method of tumble finishing called "SlideHoning" has been developed by the BMT Mfg. Corporation, Elmira Heights, N. Y. Equipment for applying "SlideHoning" consists of a multiple-barrel unit with a 48-inch revolving disc on which can be mounted as many as twenty-five barrels having a variable rotating speed ranging from 11 to 28 R.P.M. The barrels are available in different sizes and shapes as well as a variety of mountings. This equipment provides a combination of simultaneous rotary, centrifugal, and slide tumbling actions.

The controlled-motion honing possible with this unit removes burrs, flash, tool marks, rust, paint, plating, and heat-treating scale, and does not affect the dimensional tolerances of the work-piece. Such operations as rounding corners, forming fillets, and blending chamfers can all be successfully accomplished with this equipment. The appearance of parts finished by the new method is said to be materially improved. The equipment permits one operator to do effective finishing on a variety

of work-pieces, since many different parts can be done on the same machine without mixing, and both wet and dry tumbling operations can be performed at the same time.

A safety cage encloses the multiple-barrel "SlideHoning" equipment and is so arranged that the gate must be closed before the machine will start. Opening the gate automatically stops the machine, assuring maximum safety and facilitating loading and unloading of the barrels.

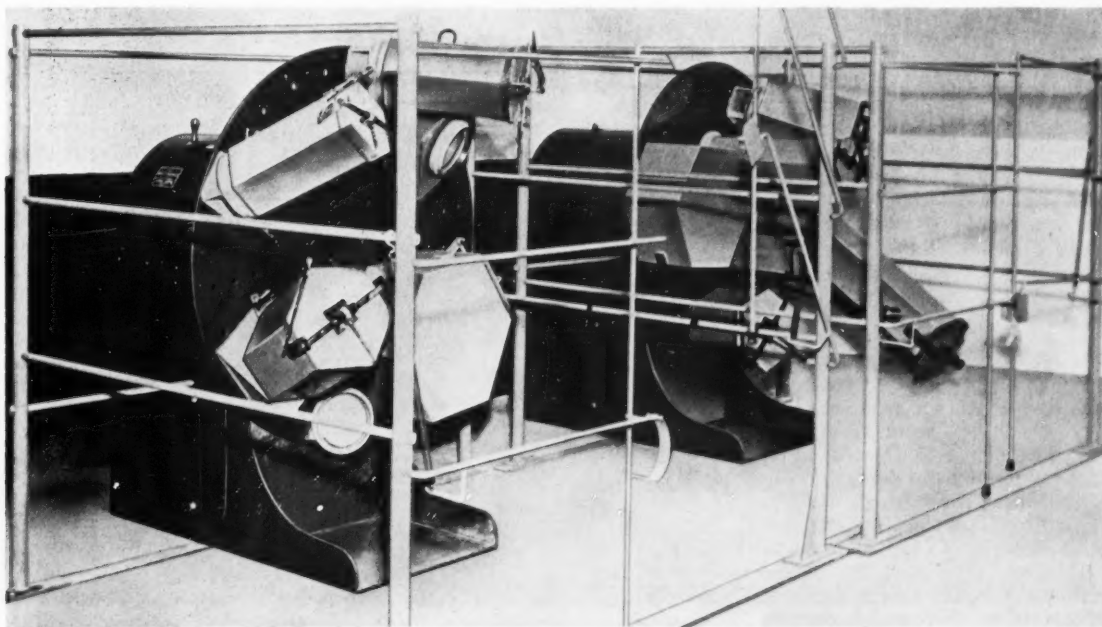
Two types of barrels are provided: a stud-mounted type that bolts directly to the rotating disc; and a quick-adaptor type that has a safety lever connection which permits instant mounting and removal from the machine. Angle adapters are provided so that barrels can be mounted at an angle to obtain the desired "SlideHoning" action. Barrels are available unlined or with a neoprene lining. Special fixtures can also be designed to hold the part in a fixed position inside the barrel so that the finishing will be directed to a specific area only. .... 109



Dual-head resistance welder brought out by the Universal Welder Corporation

### Resistance Welder for Longitudinal and Circular Seam-Welding

A dual-head resistance welding machine that maintains complete set-ups for either longitudinal or circular seam-welding has been built by the Universal Welder Corporation, Cleveland 4, Ohio. This welder has two heads, one mounted at an angle of 90 degrees to the other. This arrangement permits switching quickly from circumferential to straight-line welding, with a saving of approximately two man-hours of "down" time.



Two multiple-barrel "SlideHoning" units made by the BMT Mfg. Corporation



P & W Air-O-Limit centerless grinder gage. Insert shows the snap gage and the booster check-valve mounted on a centerless grinder, gaging through-feed ball-bearing outer raceways

### P & W Air-O-Limit Centerless Grinder Gage

A unique arrangement of gaging equipment for use on centerless grinders has been announced by Pratt & Whitney Division Niles-Bement-Pond Co., West Hartford, Conn. This equipment consists of a P & W Air-O-Limit snap gage, a booster check valve, and a light signal control unit. The signal control cabinet includes a standard gaging indicator calibrated to meet requirements, Nullmatic and Kendall regulators along with pressure gages, pneumatic precision relays with electric pressure switches, and red and green limit lights for over- and under-size indication.

The pneumatic precision relays and electric pressure switches of this equipment are said to operate on a few millionths of an inch dimensional change with consistent accuracy and repeatability. Readily adjustable control limits can be pre-set to meet varying tolerance requirements. The under- and

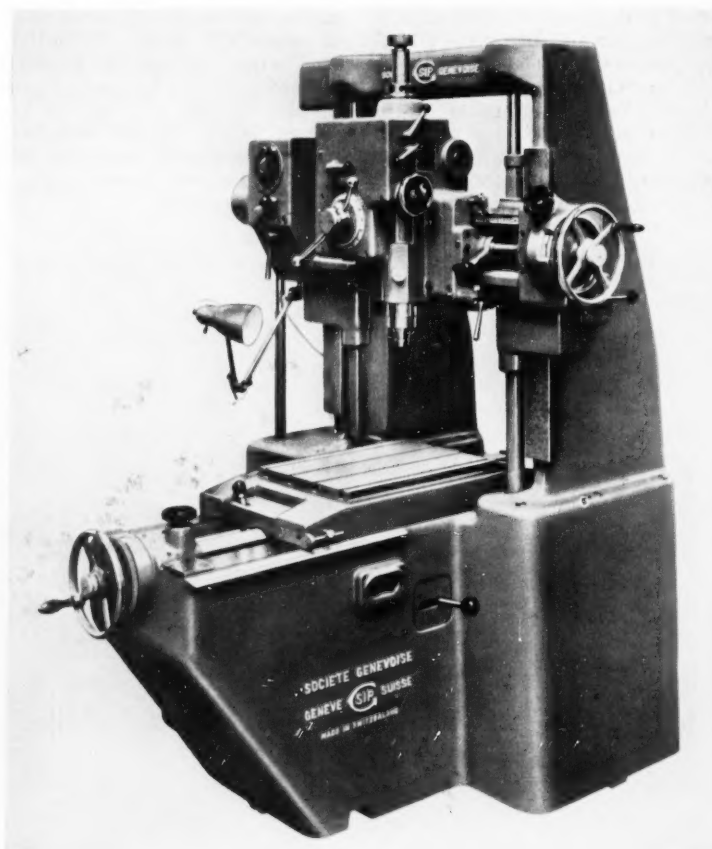
The new dual-head machine is available in a size range of from 30 to 150 K.V.A., and operates on 440- or 220-volt 60-cycle, single-phase power. Both heads operate from a single transformer, but each has an individual drive with variable speed and heat controls.

Actuating the head-selector drum switch changes from one set of controls to another and transfers coolant water flow from one head to the other. Any change-over thus leaves the idle head ready for immediate use.

Conventional wheel arrangements or any one of a wide variety of special wheel set-ups are accommodated by the machine. Although regularly supplied for continuous longitudinal seam-welding, the machine is also available for roll spot-welding. . . . . 110

### Planer Type Precision Borer

A precision borer of medium size, which is known as the 3K machine, has been introduced in this country by the American Sip Corporation, New York City. The accurate measuring screws and micrometer heads incorporated in this planer type machine are designed to adapt it for a wide range of precision shop and tool-room work within its capacity range of 18 by 14 inches. . . . . 111



Medium-size planer type precision borer introduced in this country by the American Sip Corporation



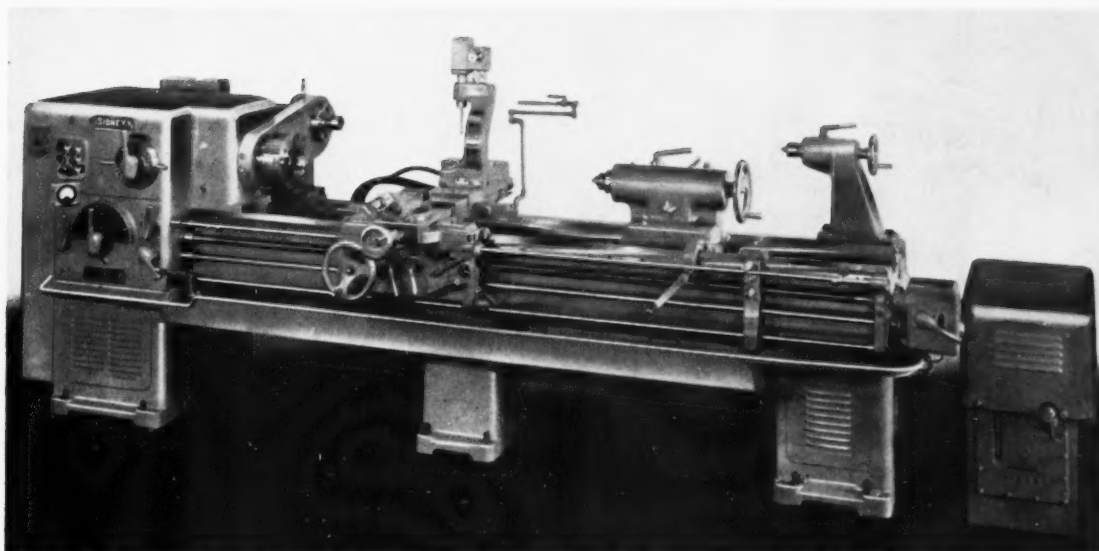


Fig. 1. Sidney fluid tracer lathe equipped with rotating drive for template or master part used in the production of duplicate pieces

over-size lights on the control cabinet, in addition to giving the off-tolerance signal, can also be utilized to shut down or control the machine. .... 112

### Sidney Fluid Tracer Lathe with Rotating Drive for Template

The versatility of the fluid tracer lathe manufactured by the Sidney Machine Tool Co., Sidney, Ohio, has been increased by the addition of a rotating drive for the template. This drive has been developed for use in work where radial as well as axial contours are required. The accompanying illustration, Fig. 1, shows a 16-inch Sidney tracer lathe with the drive. The template drive has a 1 to 1 ratio between the work-piece and the template.

As the sensitive stylus follows the template contour longitudinally, it will also, with the rotating template drive, reproduce whatever radial contour is incorporated in the master by transmitting these variations in contour to the movement of the cutting tool.

The addition of the rotating template drive does not interfere with the use of the standard tracer control nor the convenience in converting the tracer controlled lathe to standard lathe operations without the addition or removal of parts or assemblies. .... 113

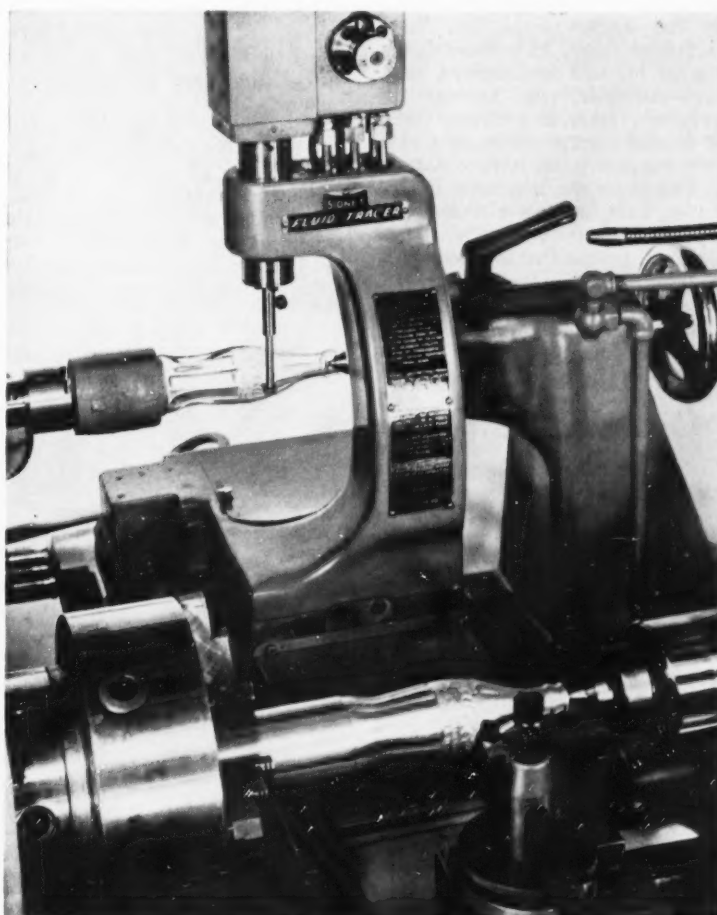


Fig. 2. Sidney fluid tracer with rotating drive for template used to produce radial and axial contours

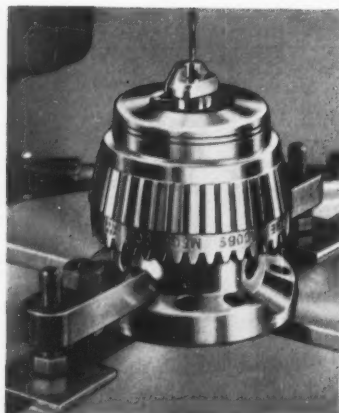


Fig. 1. Jacobs Rubber-Flex collet chuck with flange mount

### Jacobs Rubber-Flex Collet Chuck

A tool- and work-holding chuck that permits the use of Jacobs Rubber-Flex collets on different machine tools has been announced by the Jacobs Mfg. Co., West Hartford, Conn. This chuck is designed for use on grinders, milling machines, jig borers, jig grinders, lathes, and various types of special machinery where a precise compact collet is required.

This collet chuck is made in two styles, differing only in their back mounts: Model 96-F1, Fig. 1, has a flange mount; while Model 96-05, Fig. 2, is equipped with a No. 5 Jacobs taper back mount. Both have a one-piece hardened steel body. A conical bore in the front of the body accurately centralizes the collets. A hardened steel geared sleeve having a ground threaded bore that engages the thread in the collet-closing nose of the chuck is mounted on the chuck body by means of a deep-groove ball bearing. Rotation of the chuck sleeve for initial engagement of the part to be held is accomplished by hand. Final locking is effected by clockwise rotation of a geared key supplied with the chuck.

The chuck is normally used for gripping bright-finished metal bars; but because the Rubber-Flex collets have an unusual capacity range, it is also adapted to hold resilient and compressible materials, such as rubber, plastics, and wood. A further use is the gripping of delicate cylindrical pieces such as thin-walled tubing of metal, wood, or plastics.

When a through hole is required, the flange back model is recommended since it can be bolted

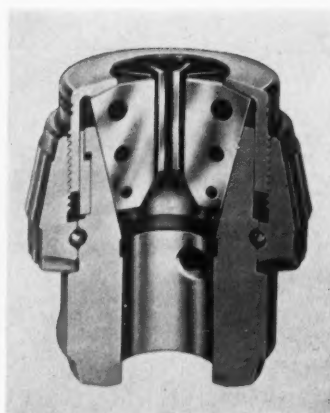


Fig. 2. Jacobs collet chuck with No. 5 Jacobs taper back mount

either directly to the machine spindle or to a suitable flanged adapter which, in turn, fits the spindle. This model is also recommended for seating on machine tables, as the face of its back flange mount is ground true with the axis of the collet conical bore. When a through hole is not required, the other model is recommended.

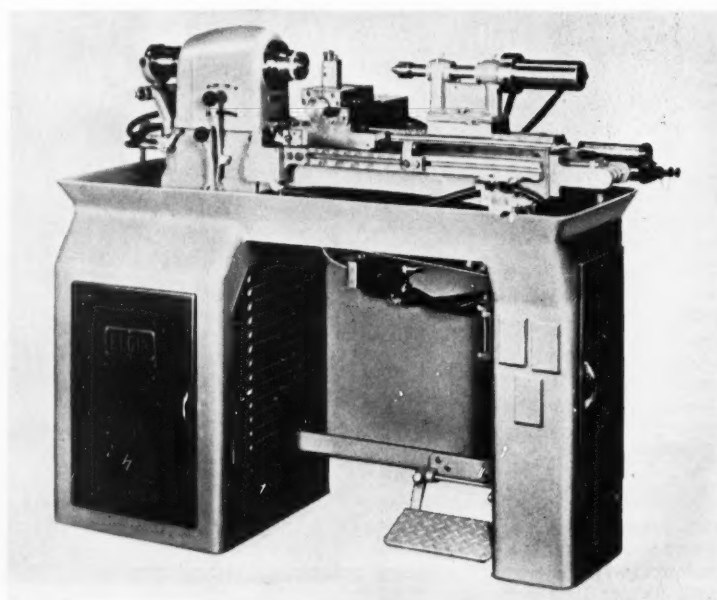
The chuck will hold any round bar from 1/16 inch to 1 3/8 inches in diameter by using its eleven Rubber-Flex collets, each of which has a range of 1/8 inch except the smallest (its range being only 1/16 inch). Each chuck is checked with a complete set of collets.

Accuracy checks are made on each collet with hardened and ground proving bars equal to the maximum, mean, and minimum capacity of the collet. Indicator run-out readings on these proving bars must be less than 0.0007 inch at the nose of the chuck and 0.0025 inch at a point 3 inches from the nose of the chuck, except for collets up to and including the 1/4 inch capacity size. These must have a run-out of less than 0.0007 inch at the nose and not more than 0.0012 inch at a point 1 inch from the nose. .... 114

### Elgin High-Production Precision Lathes

A high-production lathe was recently brought out by the Elgin Tool Works, Inc., Chicago, Ill. The carriage of this lathe is pneumatically-hydraulically powered in an automatic cycle.

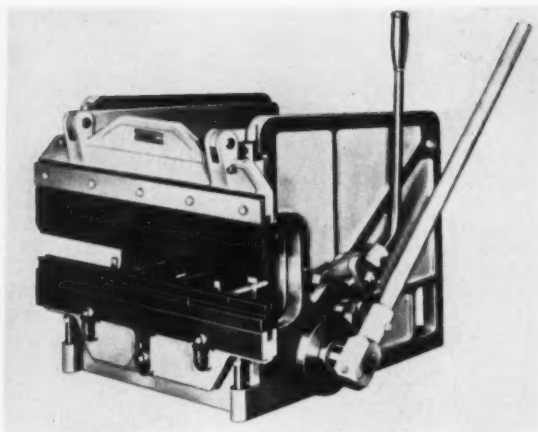
The headstock spindle is of the pre-loaded ball bearing type capable of speeds up to 4000 R.P.M. Either a draw-in collet of 1-inch capacity or a stationary collet of 13/16-inch capacity can be supplied. Power is furnished by the motor through a clutch brake drive that is electrically connected with the carriage cycle circuit to stop and start the spindle. The lathe has a swing of 11 inches and a carriage travel of 13 inches. Provision is made for automatic tool relief. .... 115



High-production lathe announced by the Elgin Tool Works, Inc.



Bausch & Lomb comparator with understage illumination being distributed by DoAll Co.



Hand-operated press brake placed on the market by O'Neil-Irwin Mfg. Co.

### Optical Bench Comparator for Rapid Inspection

An optical bench comparator with understage illumination designed for fast, convenient handling of the parts being inspected has been announced by the Bausch & Lomb Optical Co., Rochester, N. Y. This optical comparator, and also Bausch & Lomb contour measuring projectors and tool-maker's microscopes, will be distributed nationally by the DoAll Co., Des Plaines, Ill., on an exclusive basis. The optical bench comparator is designed for the rapid comparison of precision parts against master charts on either large-volume quality control operations or short-run inspections. In either case, the instrument can be used by relatively unskilled personnel. Focusing is by means of a single adjustment knob.

Because the lighting unit is located below the stage, the stage itself is completely accessible, directly in front of the operator. When large-volume production is involved, the operator merely places the work on the stage, using simple locating stops.

The part under inspection is shown in clear, bright silhouette on the 10-inch diameter, wide-angle screen, which permits viewing by several people at once. Selection from five different projection lenses provides magnifications of from 10X to 50X. Lenses are easily interchanged.

By the addition of a measuring stage accessory with micrometer drums graduated to 0.0001 inch, the projector can also be used as

a measuring instrument. The comparator is 21 inches long by 15 inches wide by 23 inches high. It can be moved about because it weighs only 110 pounds. Illumination is by a pre-focussed General Electric lamp of 6 to 8 volts, 50 candlepower, 42 watts. A cooling fan extends the lamp life and keeps adjacent component parts at a comfortable temperature level. The regular stage, or work-table is 6 by 10 inches. The measuring stage has a 1 inch-2 inch movement. .... 116

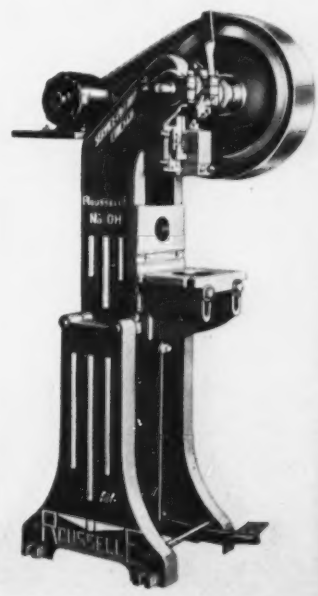
### Rousselle Horning Press for Large Work

Additional die space and adaptability for a wide range of work are features of a Rousselle press manufactured by Service Machine Co., Chicago, Ill. Both bench and floor models have ample clearance beneath the bed or horn for handling large, bulky work. The bed table has a slug clearance hole 4 inches in diameter and is adjustable in steps of 1 inch to six different keyed positions, providing die space up to 10 inches. The bed can be quickly removed for access to the horn clearance hole for drilling die-set holes in the press frame.

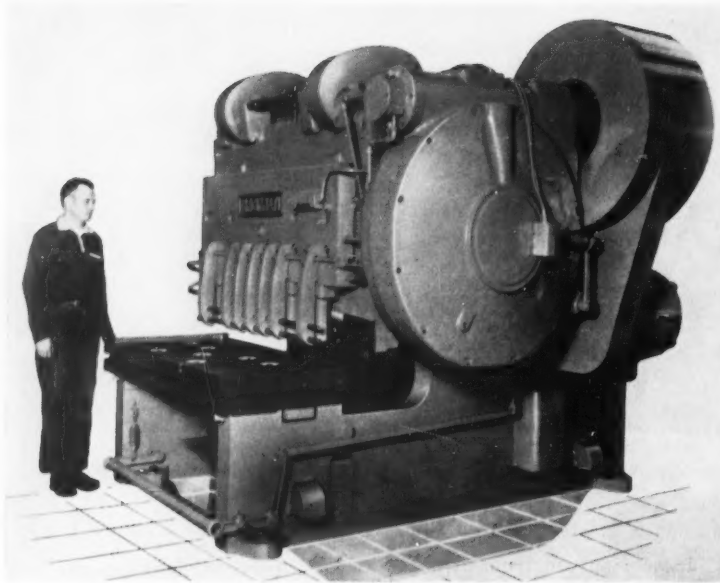
Removal of the bed permits the mounting of special fixtures directly on the press frame, which is accurately machined and can be drilled, tapped, or bored for special set-ups. Bench models have reversible legs so that the vertical frame surface can be mounted flush with the bench edge to provide clearance. .... 117

### Di-Acro Hand-Operated Press Brake

A 24-inch hand-operated Di-Acro press brake having a rated capacity of 8 tons has been announced by the O'Neil-Irwin Mfg. Co., Lake City, Minn. This machine is said to incorporate a special cam-lever mechanism that provides ample power for forming, blanking, piercing, drawing, and trimming operations. A ratchet drive system that greatly multiplies the power is provided for heavy forming jobs.



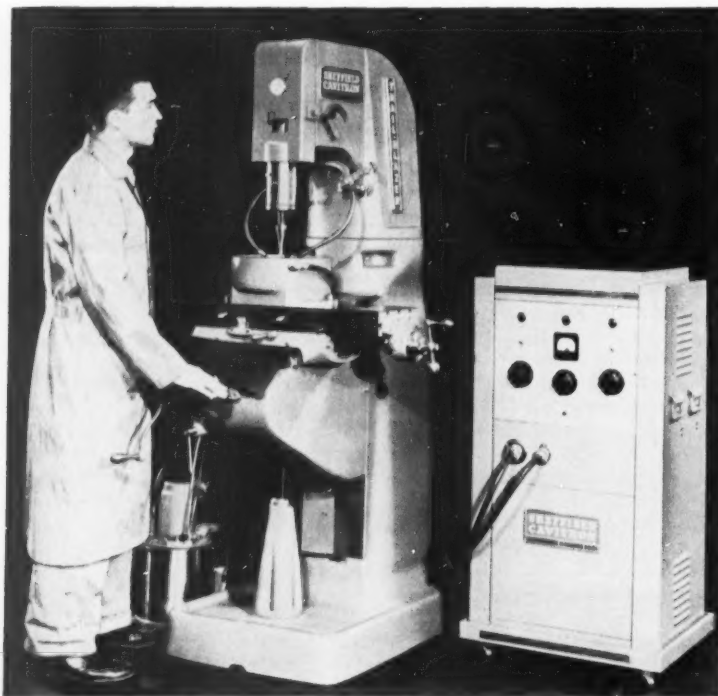
Rousselle horning press made by the Service Machine Co.



All-steel shear of increased capacity brought out by Cincinnati Shaper Co.

Primarily designed to relieve large production models of short-run forming operations, this press brake is compact enough to be quickly set up for use in experimental engineering and model shops. It has a throat depth of 6 inches, ram stroke of 2 inches, and will form 16-gage mild sheet

steel across the full 24-inch forming width or 10-gage mild sheet steel across a 12-inch forming width. Materials such as brass, aluminum, stainless steel, chromium-molybdenum alloys, and many other ductile materials can also be successfully formed on this press brake. .... 118



"Trail Blazer" Cavitron of new design brought out by Sheffield Corporation

## Cincinnati All-Steel Shear with Hinged Back Gage Angle Member

The Cincinnati Shaper Co., Cincinnati, Ohio, has brought out an all-steel shear that is capable of cutting mild steel sheet 11/2 inches thick by 4 feet long. The shear is equipped with a front-controlled power-operated back gage, having a range of 48 inches. The back gage angle member itself is hinged to allow the passage of plates that are longer than the back gage range of the machine.

The machine is made of all-steel rolled plate and has an interlocked construction. It is powered by a silent worm-gear drive, has a hardened multiple-jaw clutch, hydraulic hold-downs, a light beam shearing gage, ball transfers in the table for easy feeding of heavy plate, a safety friction drive to the flywheel, and slitting adjustments. Additional features are a long scrap chute and air counterbalances on the ram. .... 119

## Sheffield "Trail Blazer" Cavitron

A new "Trail Blazer" Cavitron has been designed by the Sheffield Corporation, Dayton, Ohio. This ultrasonic high precision model can produce accurate holes as small as 0.012 inch in diameter or slots of that width, in the hardest materials, at almost incredible speed and low cost. It will sink blind, through, tapered, or curved holes of almost any desired shape and depth; engrave matrix dies; cut keyways and oil-holes; machine serrated root forms of jet-turbine blades; and perform many other operations that would be difficult or impossible to accomplish in any other way. Repetitive accuracy in producing identical parts is an outstanding feature of this machine.

An inexpensive tool (such as soft steel) is used for the precision cutting of hard or brittle materials, either ferrous or non-ferrous. The operation is accomplished by the use of an ultrasonic tool-head vibrating from 18,000 to 30,000 cycles per second while a pump provides a continuous flow of abrasive grit in solution over the work surface. Extremely fine finishes are obtained and there is no local heating or electrical burning of the work. Chemical or physical changes do not occur in the work-piece. . . 120



## Machine with Two Heads for Cutting Caps from Connecting-Rod Forgings

The Motch & Merryweather Machinery Co., Cleveland, Ohio, has built a machine that accurately saw-cuts the cap from one-piece connecting-rod forgings. The machine has right- and left-hand sawing heads mounted on the hardened steel ways of a base. The heads, which carry high-speed steel triple-chip circular saw blades, are fed by means of hydraulic cylinders simultaneously from each side of the forging to cut the cap from the shank.

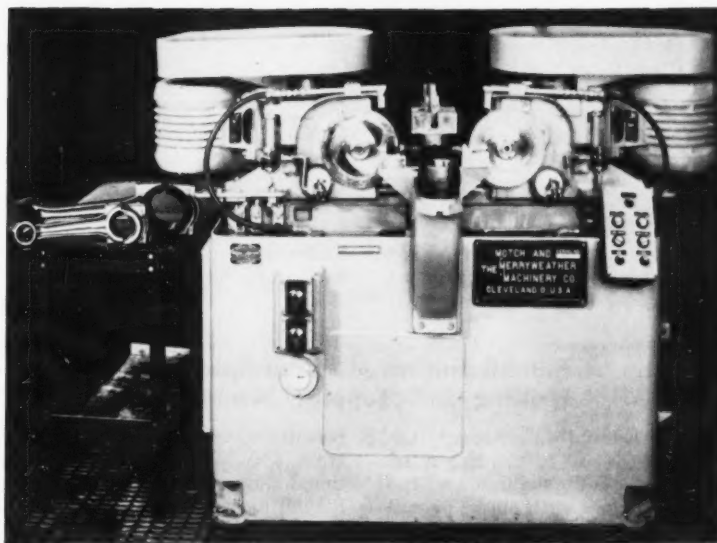
The part is located in the fixture by placing the previously machined pin end of the connecting-rod over a locating pin, with hardened steel blocks providing location at the crank end where the saw cut is to be made. Clamping is accomplished by a hydraulic cylinder over the top of the forging at the crank end. Both geared sawing heads are driven by 2-H.P. motors. The external hydraulic sump is furnished with a hydraulic pump, a 2-H.P. motor, valves, and piping in accordance with J.I.C. standards.

After placing a connecting-rod in the fixture, the operator presses a button to start the automatic cycle. This cycle consists of clamping the stock, feeding the opposing saw heads to the reset distance and return, and opening the fixture clamp. . . . . 121

## Milling Machine Designed to Handle Non-Ferrous Parts

A low-priced, hydraulic-powered milling machine designed for use wherever high-speed milling of non-ferrous metals is required has been brought out by the Onsrud Machine Works, Inc., Chicago, Ill. This A-245 machine has been developed to increase the milling speed of parts in a wide range of sizes and shapes, and at the same time reduce the cost of the machine itself to about one-half the price of the conventional miller. The machine has all the hydraulic feeds and speeds usually found in more expensive units, together with manual feed for close adjustment. Its sturdy construction insures stability and precision in working non-ferrous metals, wood, or plastics.

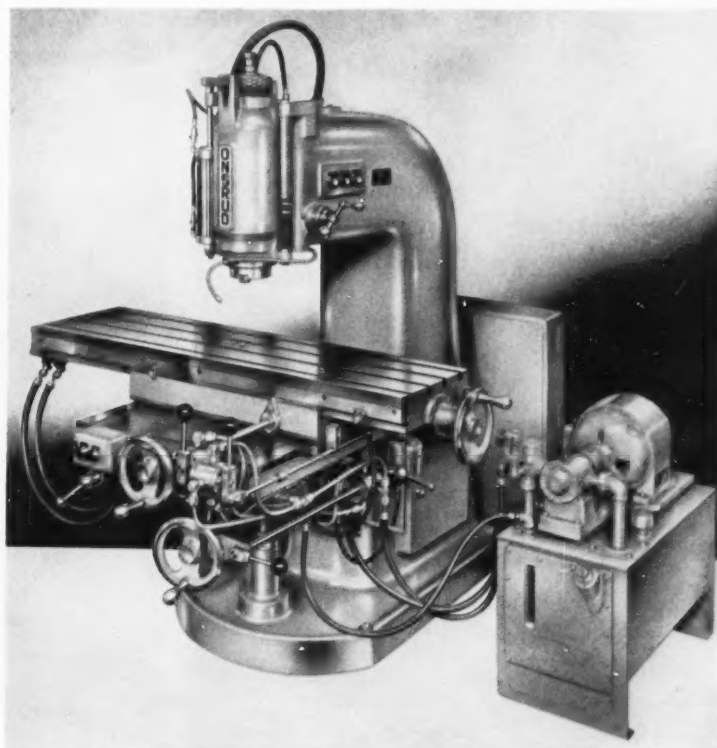
The 7 1/2- to 15-H.P., 3600- to 7200-R.P.M., spindle motor is



Motch & Merryweather machine cuts caps from connecting-rod forgings

raised or lowered by air and manually operated for close adjustment. Three special Onsrud valves actuate the hydraulic feeds of the table. The operator simply moves the lever on each of these valves in the direction of the re-

quired travel and the table speed increases as the lever angle is increased from the vertical neutral position to rapid traverse. The knee can be locked at any height with the gib clamp which is interlocked with the hydraulic lift. The



Milling machine for high-speed machining of non-ferrous metals and plastics introduced by Onsrud Machine Works, Inc.

gib must be unlocked before vertical travel can begin.

Push-buttons for starting the cutter motor and for high- and low-speed operation are mounted on the side of the head column. The cutter motor can be raised or lowered 8 inches by air pressure or manually for fine adjustment. The gib clamp locks the cutter motor in position, and there is a hand operated brake. Preloaded bearings serve to eliminate play.

### Edlund Improved Motor-Spindle Drilling and Tapping Machines

The Edlund Machinery Co., Cortland, N. Y., is building a line of motor-spindle drilling and tapping machines with single or multiple spindles, and with special-purpose extra equipment.

The Model 2 M.S. machines with 12- and 15-inch overhang are made with one to eight spindles. They are designed for both general production and tool-room use. The 2-H.P. motor gives a drilling capacity of 1 inch, which can be increased to 1 1/4 inches by using back-gears. In addition, the Edlund semi-automatic power feed, reversing-motor tapper, and lead-screw tapper can be furnished. Di-

The table is 14 by 26 inches and has a travel of 28 inches and a feeding range of 0 to 200 inches per minute. The cross-slide has a travel of 14 inches at 0 to 200 inches per minute. Knee travel is 10 inches at 0 to 50 inches per minute. The hydraulic power system provides pressures up to 350 pounds per square inch and includes a 20-gallon tank. Coolant mist feed is provided for the cutter. .... 122

rect-drive spindle speeds range from 600 to 3600 R.P.M. Additional slower speeds of 115 to 900 R.P.M. are obtainable by application of back-gears.

The Model 4 M.S. machine is designed for heavy production work or tool-room service, and provides drilling capacities up to 1 1/2 inches. Direct-drive spindle speeds range from 450 to 1200 R.P.M., and with back-gears, from 112 to 300 R.P.M. One- to four-spindle machines are available with either 12- or 16-inch overhang. All the machines can be fitted with a flange quill for multiple-head mounting. .... 123

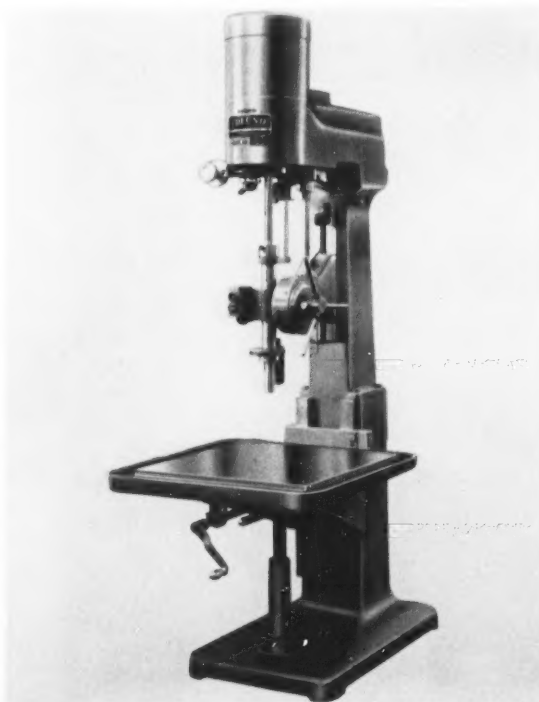
### Shim Stock of Laminated Aluminum

The Laminated Shim Co., Glenbrook, Conn., has announced shim stock of laminated aluminum in which the laminations are bonded over the entire surface yet can be peeled off for adjustment. This laminated shim material makes available the advantages of aluminum, including light weight, and freedom from corrosion.

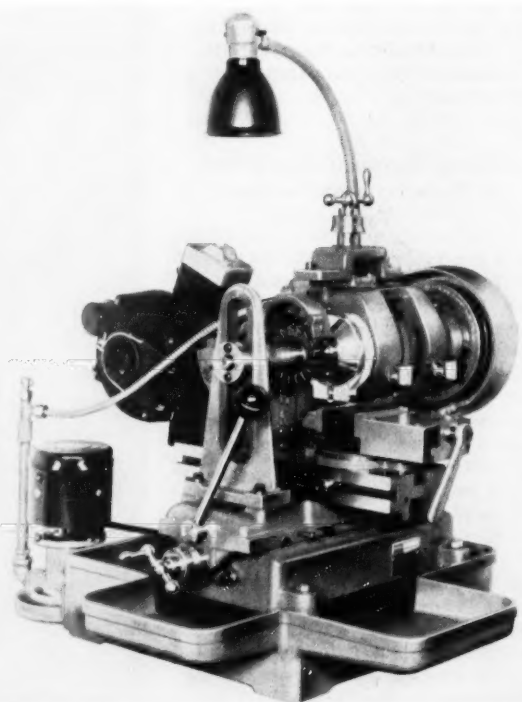
These shims are available either custom-stamped to blueprint specifications or as laminated sheet stock in thicknesses which range from 0.015 to 0.125 inch and sizes up to 20 by 48 inches. .... 124

### Line of Special Accessories for Barker Bench Type Milling Machine

The Barker Engineering Co., Cleveland, Ohio, has expanded the line of special accessories for its bench type milling machine, making it more versatile and capable of a wider range of milling and machining operations. The illustration shows a machine equipped with a low spindle-speed drive developed especially for milling steel, an arbor support which makes



Motor-spindle drilling and tapping machine of improved line built by Edlund Machinery Co., Inc.



Barker bench type milling machine which is equipped with a new line of special accessories

possible heavy milling cuts without chatter, a coolant pan with motor-driven pump, a cutter guard and spindle nose coolant shield, and the standard Barker swivel-base vise.

The model illustrated is equipped with micrometer feed-screws on the head and saddle travel positions. It is, however, possible to have hand-lever operation or micrometer feed-screw operation to control travel on all three positions. Different combinations of these feed controls can be selected to suit requirements. . . . . 125



Fig. 2. Three automotive bearing caps of different size broached on special Colonial machine shown in Fig. 1. Locating faces on the two outside caps have been broached, while the center part is unfinished

### Special Machine for Broaching Locating Faces on Automotive Bearing Caps

Broaching of the locating faces on automotive bearing caps can be done at the rate of 480 caps an hour on a horizontal machine recently brought out by Colonial Broach Co., Detroit, Mich. This special Model HB1 4-ton semi-automatic machine has a 12-inch broaching stroke with a traveling rate of 30 feet per minute. It is equipped with two adjustable, stationary broaches. Maximum return speed is at the rate of 60 feet per minute.

The fixture designed for this

machine does not clamp the part but guides it as it is pushed past the stationary broaching teeth by the ram. Three bearing caps of different sizes can be machined

while using the same fixture. Two of the caps are broached with the fixture located as shown in Fig. 1. By merely removing four hold-down bolts, the fixture is inverted, and in this position performs its mechanical guiding function for the thickest bearing cap. . . . 126

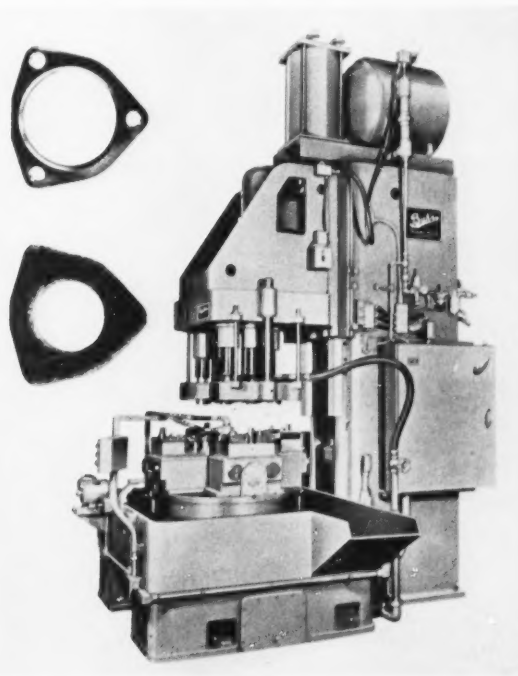
### Air Balancing System for Buhr Vertical Boring, Drilling, and Chamfering Machine

To eliminate expensive counterweight assemblies on vertical machines, the Buhr Machine Tool Co., Ann Arbor, Mich., has introduced

an air balance system. This system operates at a line pressure of 50 pounds per square inch, and has a storage tank designed to reduce



Fig. 1. Colonial special machine equipped for rapid broaching of bearing caps



Buhr vertical boring, drilling, and chamfering machine with air balancing system

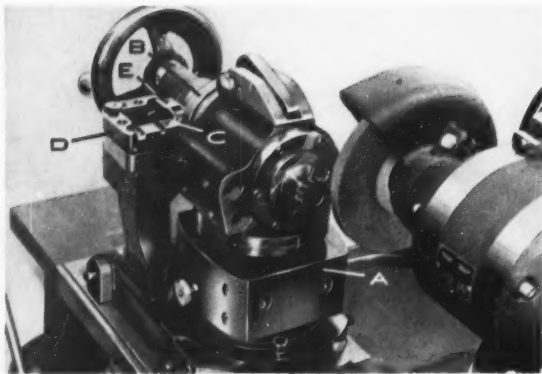


Fig. 1. A "Royal Oak" universal form-relieving fixture set up for radial relief only

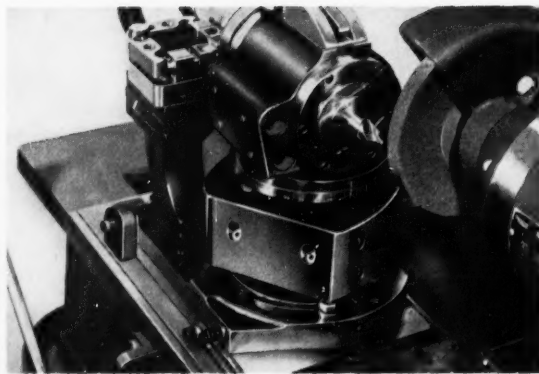


Fig. 2. Fixture shown in Fig. 1 set up for combination of radial and axial relief

air consumption to a minimum. It is equipped with a safety device to guard against air failure or creepage.

The special machine illustrated bores, drills, and chamfers two automotive steel flanges at a time, at the rate of 329 pieces per hour. The work-holding fixture, mounted on an automatic index-table, is

arranged for hydraulic clamping. Clamping of the parts takes place while the fixture is moving from the loading station to the first machining station, and unclamping occurs during the return of the parts from the final machining station to the loading station. Thus production is maintained by repetition of this cycle. . . . . 127

### "Royal Oak" Universal Form-Relieving Fixture

A universal form-relieving fixture designed to operate on a new principle has been developed by the Royal Oak Tool & Machine Co., Royal Oak, Mich. This fixture, produces either axial or radial relief, or any combination of the



Fig. 3. Relieving fixture shown in Fig. 1 with plate removed from carriage to show ways and pre-loaded roller bearings

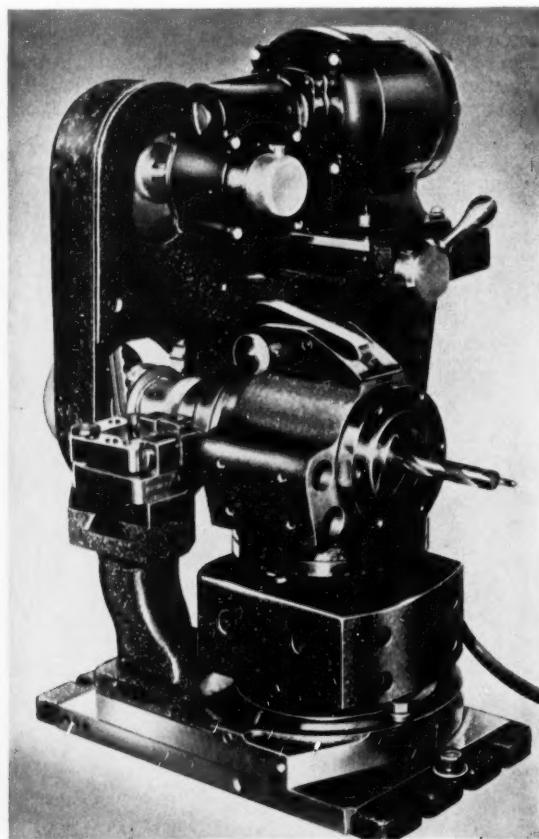


Fig. 4. "Royal Oak" form-relieving fixture equipped with direct-current 110-volt gear reduction driving motor unit



two. The set-up used for radial relief only is shown in Fig. 1. For a combination of radial and axial relief, the set-up is made as shown in Fig. 2. Form relief can be made the standard grind, for most end-and-side-cutting tools. It is claimed that cutting tool costs can be materially reduced with cutters relieved by the new fixture as more metal is left behind the cutting edge. A further advantage claimed is that the cutting edges are produced by grinding from the heel of the blade rather than back from the cutting edge.

The carriage of the fixture moves on hardened and ground ways that operate on pre-loaded roller bearings arranged as shown in Fig. 3. Instead of oscillating and "rocking" the tool into the wheel, the motion is on a single plane. The tool moves into the wheel on center for the entire grind, giving better control and eliminating vibration.

The carriage A, Fig. 1, is actuated by interchangeable cams B. The cam follower C is attached to one end of a pivoted bellcrank D on the opposite end of which is a plunger E that forces the spring-loaded fixture along the ways. A full 90-degree adjustment of the ways unit controls the direction of travel into the wheel, so that any relief—axial, radial, or a combination—can be obtained.

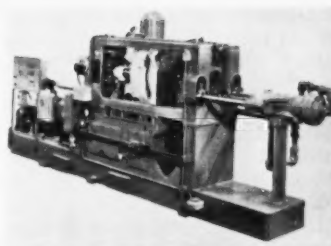
Five selective pivot points on the bellcrank enable the operator to obtain varying amounts of relief with any cam of from one to sixteen impulses. Cams can be changed in one minute. To set up the fixture, two adjustments are involved: the loosening of a nut and turning the carriage for the amount of axial and radial relief desired, and the turning of a nut and setting the spindle parallel with the table.

Circle grinding can also be performed with the fixture by simply turning a knurled thumb-screw which releases the follower from contact with the cam. The fixture can also be provided with a power unit, as shown in Fig. 4. This unit is powered with a direct-current, 110-volt gear reduction motor. Stepless speed control is obtained by means of a selenium rectifier. The gear reduction is 40 to 1, giving 44 inch-pounds torque. Speeds from 0 to 80 R.P.M. are obtainable by turning the dial. While the fixture can be mounted on other grinders, a machine specifically designed around the fixture is available from the maker. . . 128

## Lester-Phoenix Die-Casting Machine

Lester-Phoenix, Inc., Cleveland, Ohio, is building a new HP-1-C die-casting machine designed to cast up to 47/8 pounds of aluminum, or proportionate weights of magnesium or brass. This machine will accommodate dies up to 25 inches wide or 22 inches high, the latter dimension being an increase of 3 inches over that of the preceding model.

This high-speed die-casting machine has a positive toggle clamping pressure of 200 tons. With the central die height adjusting screw, dies can be set to open less than a thousandth of an inch at the full clamping position, taking complete advantage of the full locking



Improved die-casting machine built by Lester-Phoenix, Inc.

ing pressure. "Metered breathing," or venting, is still obtained under these operating conditions. The machine has two accurately aligned shot positions and is readily converted to zinc die-casting. . . . 129

## Machine for Automatic Processing of Automotive Parts

A special-purpose machine, capable of automatically drilling, reaming, and deburring production work-pieces in a twelve-station operation, has been built by Turner Bros., Inc., Ferndale, Mich. Three of these machines were specially built for a large

automotive parts manufacturer, and at the present time each machine is turning out 1400 valve plungers per hour.

The work-piece is loaded at the first station where it is automatically clamped in a diaphragm chuck by means of air valves



Drilling, reaming, and deburring machine announced by Turner Bros., Inc.

mounted on the center of the indexing table, then indexed to the second station where one 3/32-inch hole is drilled, during which time the operator loads another part. While being indexed to the third station, the diaphragm chuck rotates 90 degrees. Another 3/32-inch hole is drilled at the third station; the same operation is duplicated at the fourth and fifth stations while the indexing and loading cycle continues.

At the sixth station, a .0406-inch hole is reamed by a vertically

mounted reamer which removes the burr caused by drilling. From the seventh to the tenth station, the drilling operation is repeated, since the reaming causes some of the burrs to be pushed back into the 3/32-inch holes. This redrilling pushes the burr back into the .0406-inch hole, from which it is entirely removed at the eleventh station by a duplicate vertical reaming operation. At the twelfth and last station, the part is automatically ejected by a cam affixed to the indexing table. . . . . 130

### Special Machine for Processing Aircraft Diffuser Cases

A special machine designed to combine speed, precision, and automation in the processing of aircraft diffuser cases is announced by the Snyder Tool & Engineering Co., Detroit, Mich. The diffuser case is a hollow, truncated, stainless-steel cone-shaped part approximately 17 inches high in the center and 40 inches in diameter at the large end. The work consists of machining bosses which are irregularly spaced around the outer inclined wall of the part.

The machine has a fabricated steel base on which the index table is mounted. Three special boring and facing units mounted on columns are positioned around an index table. Two of these units have heads that are tooled to bore through a boss and then feed radially in order to face the same boss. The third unit positions the

head and has a radial feed for facing only. The slow feed rates necessitated by single-point tooling are accurately controlled by the use of 12-inch diameter hydraulic cylinders from which the hydraulic fluid is metered. Radial actuation of facing tools is accomplished by separate hydraulic cylinders. The heads are arranged around the index table so that all bosses are machined with a minimum number of indexing movements.

The part is loaded into a fixture that clamps it on the flanges at the large outer rim. The inside of the part is supported by an expanding arbor. The fixture is mounted concentrically on the five-station index table, which is keyed for five unequally spaced indexes. The table is driven by a fluid motor. After the part has been loaded and clamped manually, the work cycle

is performed automatically as follows: two units bore and face two bosses; the table automatically indexes and again two units bore and face two bosses; the table indexes three more times, and each time a single unit performs a facing operation. The fifth index brings the table back to the original position where the part is unclamped and unloaded. . . . 131



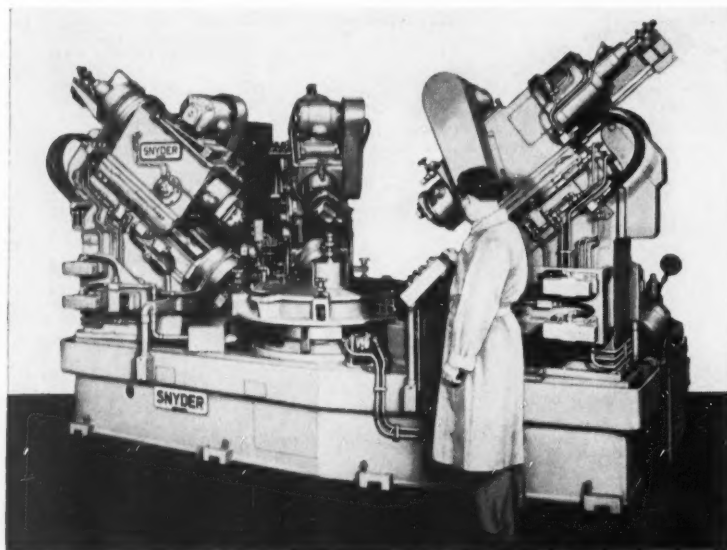
Disassembled "Dual-Wedg Lock" and wrench. (Inset) View of the lock, milling cutter body, and blade

### "Dual-Wedg Lock" for Milling Cutter Blades

A "Dual-Wedg Lock" for securing blades in milling cutter bodies has recently been introduced by the Wesson Co., Detroit, Mich., in an improved series of staggered-tooth and half-side milling cutters. This series of cutters is recommended for most general-purpose straddle-, face-, and gang-milling and slotting operations. The new cutters have hardened steel bodies, broached blade slots, and replaceable blades. Both the blades, tipped with Wessonmetal carbides, and the cutter body are serrated to facilitate adjustment. The 60-degree 1/32-inch pitch serrations make fine positive adjustment possible.

The "Dual-Wedg Locks" slip easily into a cylindrical recess in the body and the two wedges are locked on the face of the blade by several turns of the locking screw. The lock seats itself both axially and radially even if the blade being locked has a step, is out of square, or slightly tapered.

The staggered tooth and half-side milling cutters are available in diameters of 5, 6, 8, 10, and 12 inches. Standard widths of these cutters, determined by the blade widths, are 5/8, 3/4, 1, 1 1/4, and 1 1/2 inches. . . . . 132



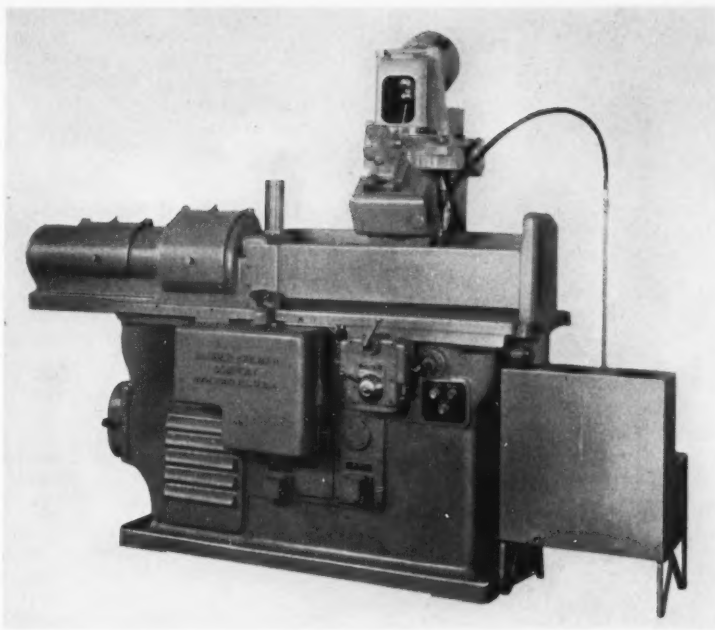
Snyder special automatic machine designed for boring and facing operations on bosses spaced around aircraft diffuser cases

## Barber-Colman Redesigned Hob and Cutter Sharpening Machine

The No. 10-12 hydraulic sharpening machine made by the Barber-Colman Co., Rockford, Ill., has been redesigned to accommodate wet grinding of high-speed steel and carbide-tipped hobs and form-relieved cutters. The new wheel- and work-spindles are protected against the effects of coolant. Splash guards, a coolant tank, and a motor are extra equipment which may be ordered for installation on a standard machine.

The wheel-spindle has also been made more rigid for a finer surface finish on the faces of the hob or cutter flutes. Wheels are mounted on an adapter that fits on the tapered wheel-spindle. This allows diamond wheels to be trued on a tool grinder without destroying any of their trueness when remounted on the sharpening machine. The wheel motor is mounted parallel to the wheel-spindle, and the drive is through a Gilmer timing belt, eliminating any possibility of slippage. A new dresser provides for easier and more accurate setting of the diamond.

The sharpening machine handles a wide variety of tools with straight or helical flutes, shell or shank type, up to 10 inches in diameter by 12 inches face width. All operations in the machine cycle can be accomplished automatically by making the proper



Redesigned hob and cutter sharpening machine made by the Barber-Colman Co.

settings on conveniently located controls. When the settings have been made, the machine automatically indexes and feeds to remove the desired amount of metal

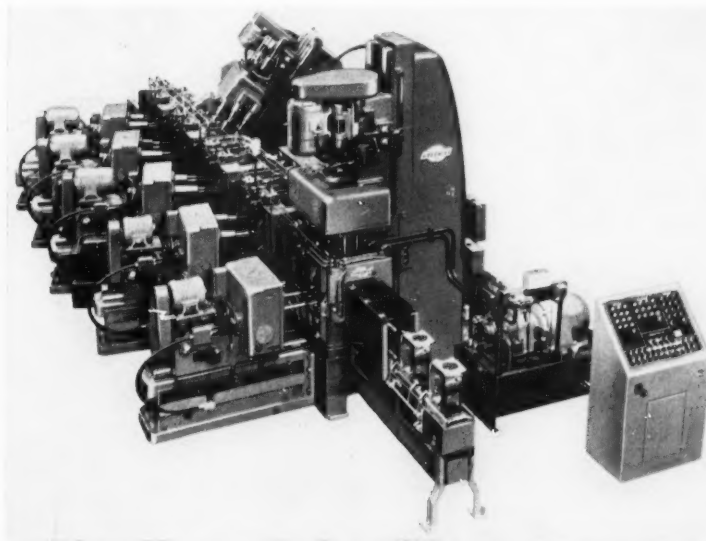
from each flute. Table speed is variable by adjusting the hydraulic flow control valve. With these automatic controls, one man can operate several machines. . . . 133

## Greenlee Transfer Machines for Processing Transmission Cases

An automatic production line consisting of four transfer machines designed and built for machining automotive transmission

cases has been announced by Greenlee Bros. & Co., Rockford, Ill. The machines combine the facilities of 247 tools to complete 265 operations in 29.5 seconds, averaging 122 cases per hour at an operating efficiency of 100 per cent. The seventeen-station transfer machine shown second in line in the illustration performs drilling and reaming operations on the bottom, top, and end of the transmission cases.

Outstanding features of these machines are the safety devices. Steel mesh guards provided on and between each working station are hinged to allow easy access to the transmission cases for inspection and removal. All guards are electrically interlocked, permitting the machine to run only when all the guards are locked down. Each machine is equipped with an easy-to-reach emergency cord for stopping operation. All functions of the machines are hydraulically operated and electrically interlocked. Any malfunction is readily detected and the trouble located immediately by a system of lights mounted on the control cabinet. 134



Line of transfer machines for processing automotive transmission cases designed and built by Greenlee Bros. & Co.





Norton grinding wheel developed for foundry use

### Norton Vitrified Grinding Wheel for Foundry Use

The Norton Co., Worcester, Mass., has announced a vitrified grinding wheel for foundry use at speeds up to 6500 surface feet per minute. This "K" bond snagging wheel is said to give up to 30 per cent longer life with faster, freer cutting qualities. It was designed to provide an efficient Crystolon silicon carbide wheel for rough-grinding cast iron. A minimum of dressing is required to keep the wheel sharp, and the corners are said to resist rounding.

"K" bond wheels can be made in all the sizes, shapes, grit sizes,

and grades (hardness) used on floor-stand, bench-stand, swing-frame, and portable grinders of the slow speed type (6500 surface feet per minute) for snagging gray and hard malleable iron castings. .... 135

### DoAll Band Machine

The DoAll Co., Des Plaines, Ill., has introduced a new line of 16-inch band machines in the low-price field which have a capacity for cutting work up to 12 inches in thickness. They are powered for tough metal sawing operations and are more than adequate for sawing woods, plastics, and numerous other materials. Band filing, metal polishing, and carbide-finishing as well as slicing can be accomplished by applying the proper DoAll band tool, tool guides, and attachments.

The machines are intended for use in the tool-room or for light production work with standard band saw blades. A heavy trunnion and cradle support the work-table, which is 24 by 24 inches. The table tilts 45 degrees to the right and 10 degrees to the left. The saw-blade welder handles blades up to 1/2 inch in width.

There are twenty different attachments available for making this a versatile machine for standard contour sawing, filing, and polishing operations.

Models available include, machines with fixed- or variable-speed controls with a range between 50 and 5200 feet per minute. There are also variable-speed models encompassing high or low ranges for high-speed, friction, or conventional sawing. Also, there is a machine for operation at both low and high speeds. The machines with fixed controls include models with either a single speed or stepped speeds. .... 136

### Power Feed Units for Fray Milling Machines

The Fray Machine Tool Co., Burbank, Calif., has added two new power feed units as accessories to its line of high-precision milling machines. There are two types: a table unit for Models 10-R and 10-RH; and a power down feed for the Type 4 Fray "All-Angle" milling attachment. Both units will be available as attachments for new machines.

The table power feed is arranged for pick-off gears in sizes from 1/2 inch to 13 inches and includes a built-in 1/3-H.P. motor. This unit is attached to the saddle of the machine to assure extreme rigidity. The head power feed unit is arranged for three feeds—0.0015, 0.003, and 0.006 inch per revolution. .... 137

(This section continued on page 237)

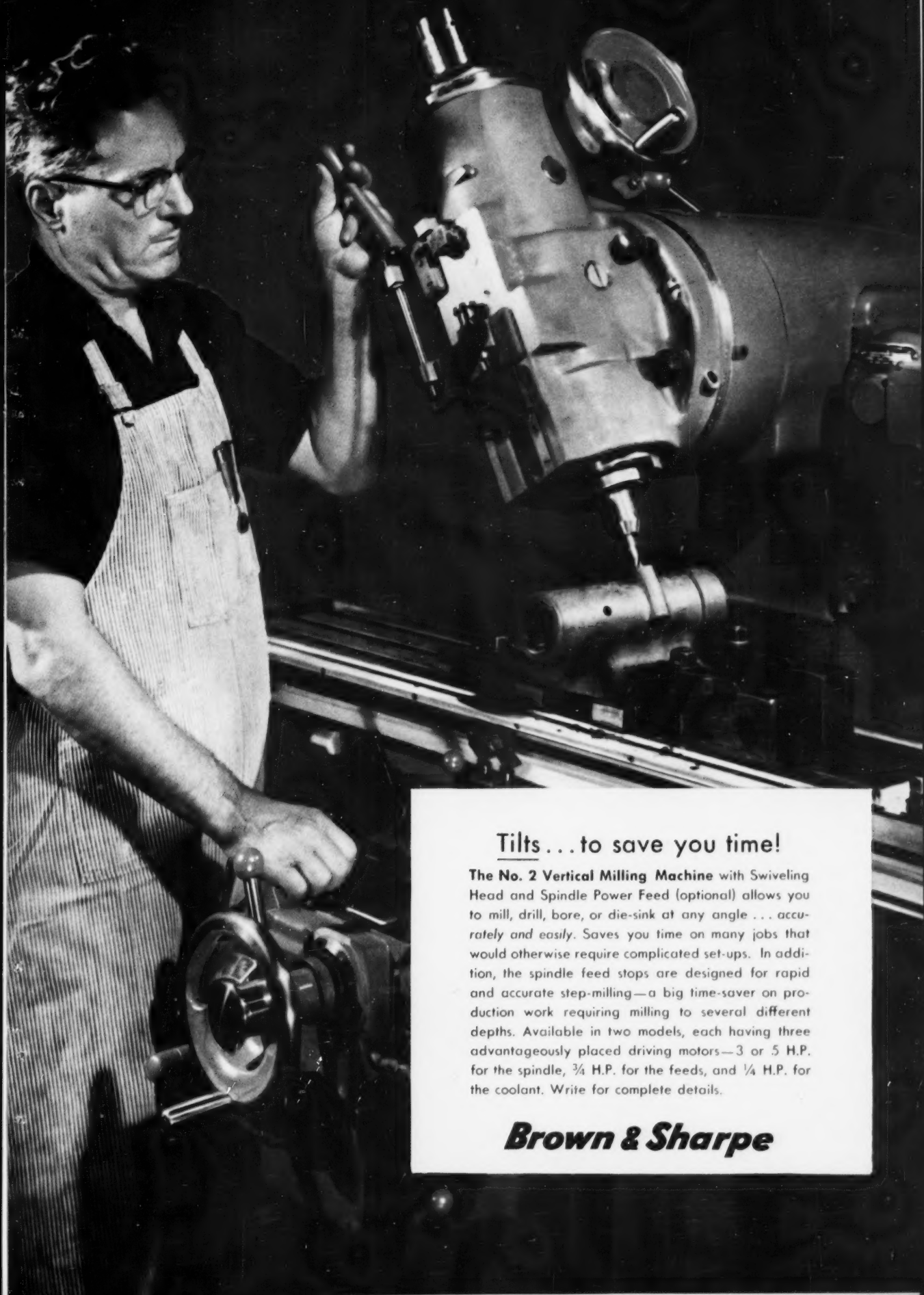


DoAll band machine having numerous attachments for tool-room and light production work



Fray milling machines equipped with power table feed and vertical head with power feed






### Tilts . . . to save you time!

**The No. 2 Vertical Milling Machine** with Swiveling Head and Spindle Power Feed (optional) allows you to mill, drill, bore, or die-sink at any angle . . . accurately and easily. Saves you time on many jobs that would otherwise require complicated set-ups. In addition, the spindle feed stops are designed for rapid and accurate step-milling—a big time-saver on production work requiring milling to several different depths. Available in two models, each having three advantageously placed driving motors—3 or 5 H.P. for the spindle,  $\frac{3}{4}$  H.P. for the feeds, and  $\frac{1}{4}$  H.P. for the coolant. Write for complete details.

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Permanent Magnet Chucks • Pumps

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## Spreadarc Automatic Welding Equipment

The Lincoln Electric Co., Cleveland, Ohio, has brought out new automatic welding equipment for producing wide beads or pads of weld metal in a single pass. The equipment, called "Spreadarc," can be mounted on a standard Lincolnweld automatic head so that it oscillates the head back and forth at right angles to the direction of travel. The amount of oscillation can be controlled to produce a pad of weld metal up to 4 inches in width in a single pass. It may be used to build up a layer of hard-surfacing metal or mild steel.

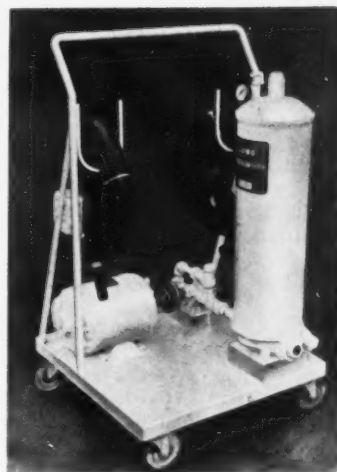
The Spreadarc attachment can be installed on Lincolnweld heads now in use without any major changes. It is powered by its own variable-speed electric motor which, acting through an eccentric, oscillates the welding head assembly. The width of the oscillation is controlled by an adjustment of the eccentric and the number of oscillations per minute by rheostat control of the motor speed. The attachment may be turned off when normal straight welding beads are desired.

Hard-surfacing with this equipment is performed with the hidden-arc welding process. Automatic hard-surfacing can be applied to flat or round surfaces. The equipment is normally employed in combination with multiple-arc welding, using two small wires in place of one larger wire. The two wires and the resulting two arcs increase the size of the weld

crater, reducing penetration while increasing the deposition rate. Typical applications are scraper blades, tractor shoes, crusher rolls, shovel and dredge parts, hammers, crane ways, and dipper teeth. 138

## Cuno Portable Filtering Unit

A portable filter completely equipped with pump, motor, oil-resistant hose, and gages is available from the Cuno Engineering Corporation, Meriden, Conn. It filters lubricants, hydraulic oils, coolants, and a wide range of industrial fluids, particles as small as 25 microns in size being removed. The standard unit is equipped with a 1/2-H.P. motor and a gear pump with a capacity of 4 gallons per minute. . . . . 139



Cuno portable filtering unit

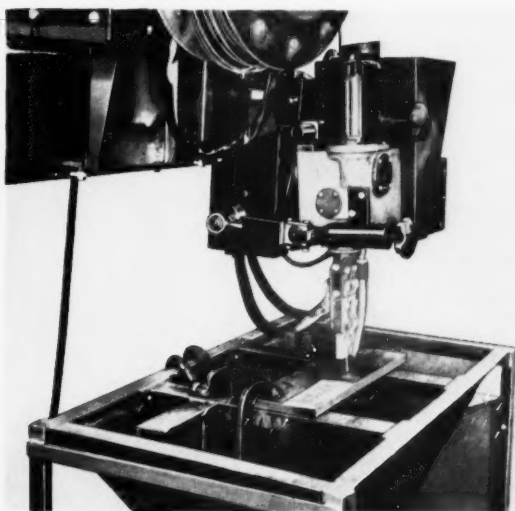
## Wade Improved Hand Screw Machine

A Model No. 73 hand screw machine with improved features has just been placed on the market by the Wade Tool Co., Waltham, Mass. This machine has a new drive for the headstock spindle which employs a timing belt. It is claimed that this transmission drive will eliminate many driving problems and help in maintaining operating accuracy.

Another new feature, said to be exclusive on this machine, is the mechanical reverse, which gives instant reversals without disturbing the continuous forward operation of the motor. A hardened and ground self-centering bed has two

symmetrically beveled sides, assuring balanced precision alignment of all attachments. The drive, completely enclosed in the pedestal cabinet, gives an infinitely variable speed with a top spindle speed of 3500 R.P.M. It is powered with a 1-H.P. motor. Instantaneous "high-low" speeds in a ratio of 5 to 1 are obtained through a clutch.

A brake provides for quick stopping of the headstock spindle. The headstock is totally enclosed, has a 1-inch collet capacity, and is equipped with high precision bearings. All bearings have a slight pre-load to eliminate deflection and yield, and to assure an extremely rigid spindle for close-tolerance work. . . . . 140



Lincoln Spreadarc oscillating attachment on welding head



Hand screw machine placed on market by Wade Tool Co.



## Warner & Swasey Power Chuck Wrench Unit

Among the attachments available for the heavy-duty turret lathes, Models 1A, 2A, 3A, and 4A, recently announced by the Warner & Swasey Co., Cleveland, Ohio, is a redesigned power chuck wrench unit. This unit enables the operator to chuck even the heaviest forgings with little effort. An electric motor, operating through a controlled torque clutch, does the work. An adjusting nut regulates the gripping pressure of a multiple disc clutch with an infinite number of settings so that the heaviest forgings can be gripped securely, or the most delicate work held without distortion.

The pistol grip control handle for the power chuck wrench is mechanically interlocked with the main control lever on the headstock of the machine to provide safe operation. Before the chuck wrench can be engaged, the main control lever must be in the "brake" position. When the chuck wrench is being used, the main control lever cannot be moved out of the brake position to engage either the forward or reverse drive clutches.

To provide the necessary additional breakaway torque when releasing a piece, a solenoid booster sets the torque clutch tight, permitting the full motor torque to be applied to the chuck for opening the jaws. Reversal of direction of the booster for internal or external chucking is obtained by a selector switch on the control panel of the machine. . . . . 141

## M & N Hobbing Press with Improved Power System

The M & N Hydraulic Press Co., Clifton, N. J., has announced a new hobbing press, Fig. 1, that has a simplified and improved hydraulic power system which elim-



Fig. 1. M & N hobbing press with sub-plate mounted control valves

inates in-line mounted hydraulic controls, piping, and fittings. A solid steel sub-plate serves as a mounting for all necessary control valves, as shown in Fig. 2. Each valve is held in place by four screws, sealed with re-usable neoprene O-rings, and can be easily removed for maintenance.

The new control system, orig-

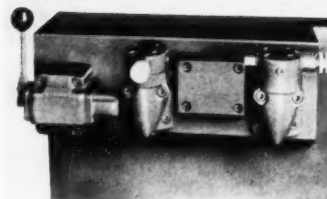


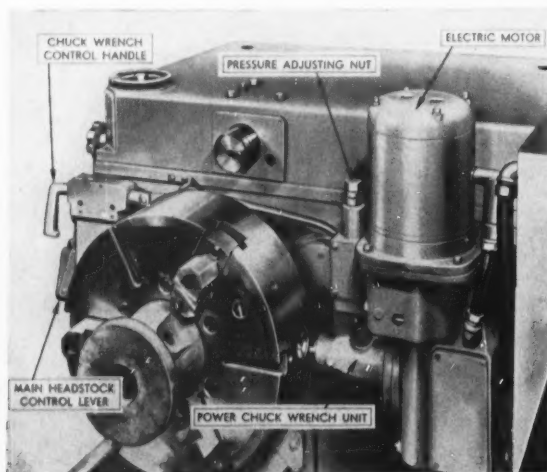
Fig. 2. Close-up view of M & N control valve assembly

inally developed for use on the hobbing press, is also available on transfer molding, compression molding, and metal-working presses. Hydraulic solenoid valves can also be supplied for semi-automatic operation.

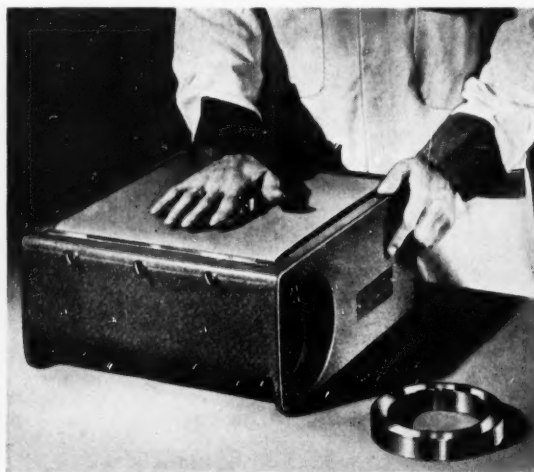
The handwheel type of directional control is still available to those who prefer the flexibility of operation that this control affords. The hobbing press illustrated utilizes this control. Where fast-acting presses are desired, however, the lever-actuated four-way valve, Fig. 2, is usually preferred. . . . . 142

## Polishing Stand for Optical Polishing Paper

A portable polishing stand, designed to eliminate difficulties experienced in holding optical polishing paper flat on a metal plate, is being marketed by the Crane Packing Co., Chicago, Ill. The stand will hold the paper taut, preventing buckling, or portions of its surface from being raised by the edges of the work during polishing operations. The stand



Power chuck wrench made by the Warner & Swasey Co., for its new line of turret lathes

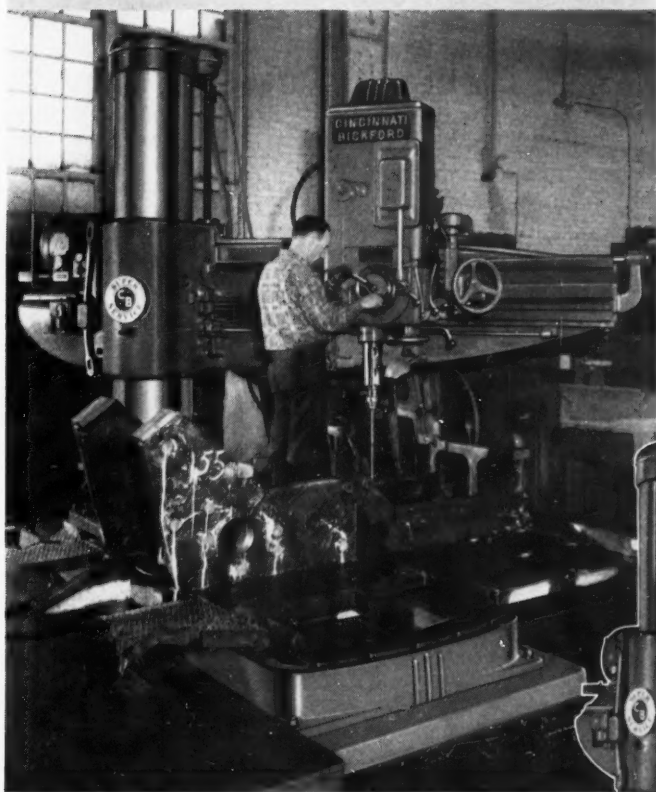


Portable stand for optical polishing paper introduced by the Crane Packing Co.



# "top performers"

AETNA-STANDARD ENGINEERING CO.  
ELLWOOD CITY, PA.

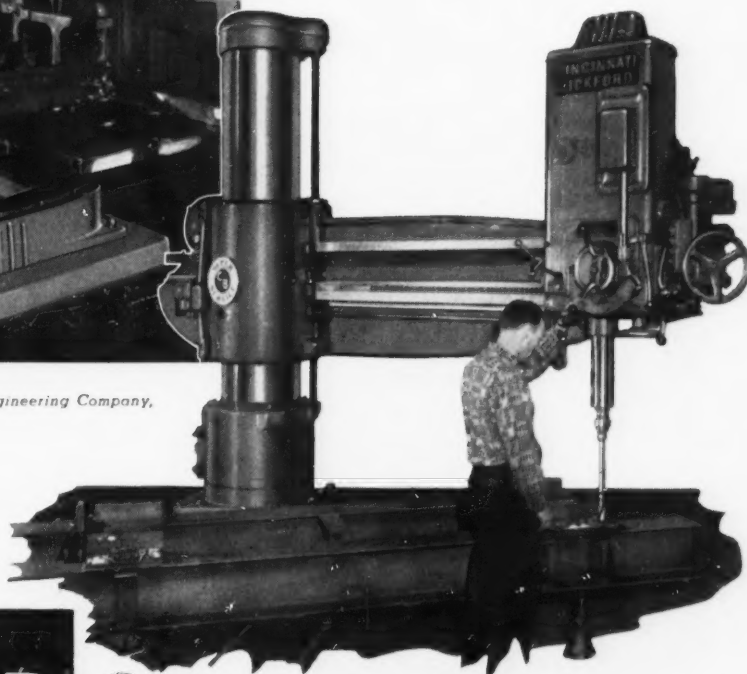


*Photos courtesy of the Aetna-Standard Engineering Company,  
Ellwood City, Pa.*

The Aetna-Standard Engineering Company say—"It is our opinion on radial drills that Cincinnati Bickford Super Service Radial Drills are top performers from the standpoint of service and handling ease".

Illustrations show the top carriage of gun carriage being drilled, tapped and reamed complete on this Cincinnati Bickford Super Service Radial—holes from  $\frac{1}{4}$ " to  $1\frac{1}{4}$ ", limits within .0005".

Write for Booklet R-29.



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RADIAL AND UPRIGHT DRILLING MACHINES

**THE CINCINNATI BICKFORD TOOL CO.**

Cincinnati 9, Ohio, U.S.A.

also eliminates time consumed in replacing the paper after use.

The polishing paper, which is available in 12-inch wide, 50-yard rolls, is held in a recess at one end of the unit and is threaded across a steel plate or "stage" that has been lapped to a high degree of flatness. By means of a simple clamping arrangement, a 12- by 12-inch section of paper is rigidly held in place on the stage. It is then made taut by raising the "stage" by two jack-screws located under the base. When a section of paper becomes worn, a new section can be immediately brought into use by loosening the restraining clamps, lowering the stage, and feeding the paper through to the desired position. The new stand has been primarily developed for polishing work-pieces for inspection during surface grinding or lapping operations, in laboratories, or on small-run polishing jobs. .... 143

### G-E Contact Welding Electrode

A contact electrode developed for high-speed welding is announced by the Welding Department of the General Electric Co., Schenectady, N. Y. Best suited for work on mild and medium-carbon steel, the electrode rod is adapted

for welding machine parts, low-pressure storage tanks, and light structural work. It is said to be suitable for many welding operations requiring AWS Class E6012 and Class E6020 electrodes.

The electrode is encased in a rutile type covering enriched with iron powder. It can be used effectively on horizontal and flat position fillets and laps, single- and multiple-pass butts, and deep grooves and cover passes on multiple-pass butt welds. Since the electrode is of the contact type, less physical effort is expended in welding. For the same reason, less welding skill is required of the worker. The contact electrode develops a minimum of spatter, and the resultant weld slag is removed by a light tap. .... 144

### Low-Temperature Chambers for Cold-Treating Metals

Low-temperature chambers for cold-treating metals have been brought out by Tenney Engineering, Inc., Newark, N. J., to further expand its line of "Sub-Arctic" equipment to include models for producing temperatures to -170 degrees F. These units have special rotary compressors designed for use with the latest Freon refrigerants.

The new unit illustrated is

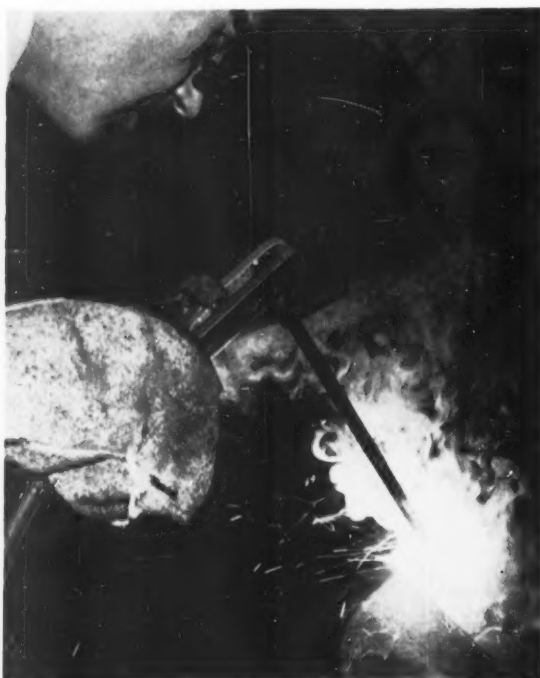


Tenney low-temperature chamber for cold-treating metals

available with work spaces of 1, 4, 6, 9, and 12 cubic feet. Four sizes are available for producing temperatures to -40, -80, -100, -120, -150, and -170 degrees F. The 1-cubic foot model, however, produces temperatures down to only -120 degrees F. Typical metal-treating applications of these units include quick-aging, stabilizing, stress equalization, shrink-fitting, hardening, and super-hardening tool steels. . . 145

### Keller Portable Automatic Drilling Unit

A self-contained drilling unit called the Series 92A Keller "Air-feedrill" has been placed on the market by the Keller Tool Co., Grand Haven, Mich. This unit



G-E contact electrode facilitates high-speed welding



Automatic drilling unit announced by the Keller Tool Co.

# How to Pick the Right Cutting Oil



## WORD OF MOUTH?

It gives you the answer sometimes, but not many of your friends have the same cutting oil requirements and the same problems that you have. It's much surer to depend on specialists like Sun.



## LABORATORY ANALYSIS?

Sure. But there's no formula for correlating the laboratory analysis with how well the cutting oil will work on your job. It takes years of field experience like Sun's to help you make the right choice.



## ELABORATE SHOP TEST?

This will probably give you the answer. But it's expensive and interferes with production when you try to test all the oils available. Sun's experience can help keep your shop-testing to a minimum.



## EXPERIENCE IS THE ANSWER.

And Sun has it. Its field representatives have probably come across problems similar to yours many times. If they haven't, its cutting oil specialists and metallurgical technicians are ready to help with your problem.

Soluble or straight, transparent or black, light or heavy duty — Sun makes the kind of cutting oil you need to handle your job at the lowest cost. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. M-6.

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automatically advances, retracts, and stops—all at a touch of the control valve. A sensing type advance arrangement moves the drill quickly to the work, then shifts to a pre-set drilling feed. When applied to skip drilling, the drill returns to rapid advance after each break-through. An automatic peck-drilling action is available that retracts the drill as often as necessary to clear the flutes during work on deep holes.

The speed of the air motor may be adjusted over a wide range while maintaining full thrust. The motor also rotates on the return stroke. The Airfeedrill can be furnished with either Jacobs chucks or Morse taper adapters. Stationary mounting adapters are available. This series is made in three basic sizes and fourteen different models having speeds from 250 to 15,000 R.P.M. and strokes from 2 to 7 inches. .... 146

### Single-Wheel Wet Tool Grinder

The Standard Electrical Tool Co., Cincinnati 4, Ohio, is now building a compact 30-inch single-wheel wet tool grinder designed for vibrationless operation. The versatile two-speed multiple V-belt drive from a 5-H.P. motor to the grinding spindle has a safety interlock that prevents overspeeding.

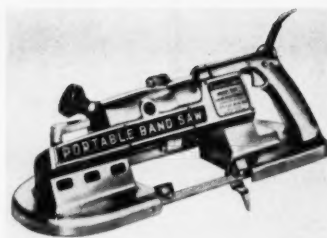
The splash pan supports a 10-inch square work-table, which has

a groove in its surface for a vernier gage and reversible wear plates that are renewable. The table can be adjusted 15 degrees above and 30 degrees below the horizontal position. A built-in reservoir and a settling chamber (both with clean-out drains), an adjustable nozzle, and a control valve are included in the coolant system. Access to the ball-bearing motor and self-priming coolant pump is through a large opening at the rear of the machine. Six wheel sizes ranging from 12 to 24 inches are available. .... 147

### Porter-Cable Metal-Cutting Band Saw

A portable electric metal-cutting band saw that weighs only 16 pounds has been introduced by the Porter-Cable Machine Co., Syracuse, N. Y. This Model 524 Porta-Band saw can be used free-hand in any position. It has a stock-cutting capacity of up to 3 3/4 by 4 1/4 inches. Equipped with a 1/2-H.P. driving motor, this machine serves to eliminate fatigue, make clean, accurate cuts, and save time on jobs that formerly had to be done by hand. It permits even inexperienced workers to cut ferrous and non-ferrous metals, plastics, and other problem materials with speed and accuracy.

The continuous flexible blade is 0.020 inch thick, 44 7/8 inches long, 1/2 inch wide, and is available in a range of six to thirty-two



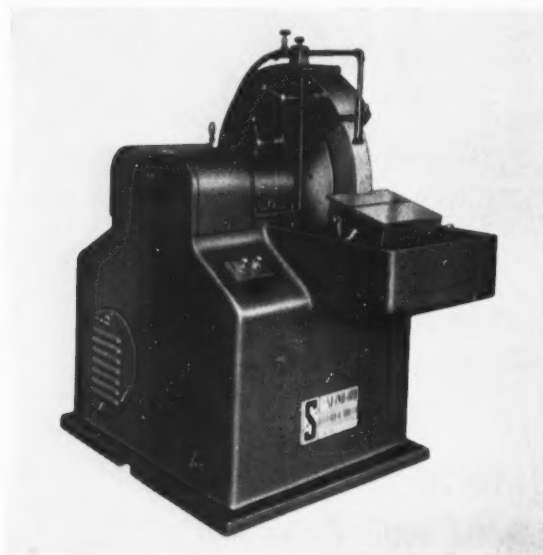
Portable metal-cutting band saw made by Porter-Cable Machine Co.

teeth per inch for all types of cutting. A simple blade-changing device makes it possible to quickly remove and insert blades. ... 148

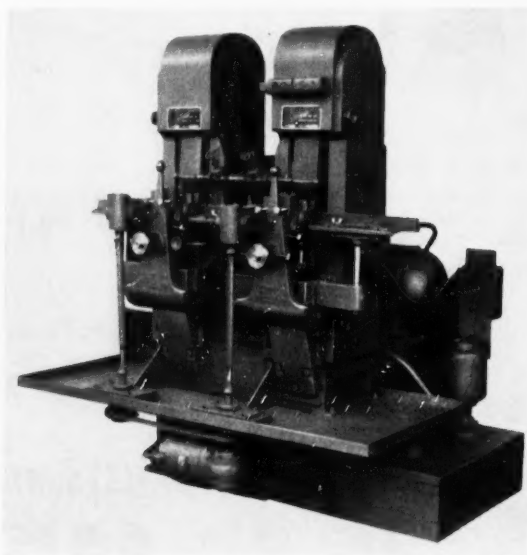
### Centerless Polishing and Finishing Machine

A centerless polishing and finishing machine recently developed by the Production Machine Co., Greenfield, Mass., is said to be the first duplex or two-head machine to use abrasive belts and coolants. It is equipped with a separate feed-drive motor and recirculating coolant system. The machine is especially adapted for handling materials such as rubber, glass, and thermoplastics which require coolants.

The machine is also available in a single-head model for plunge cut operations or where only a single pass is required. Work up to 1 1/2 inches in diameter and of any length within its weight limitations can be handled. .... 149



Single-wheel wet tool grinder manufactured by the Standard Electrical Tool Co.



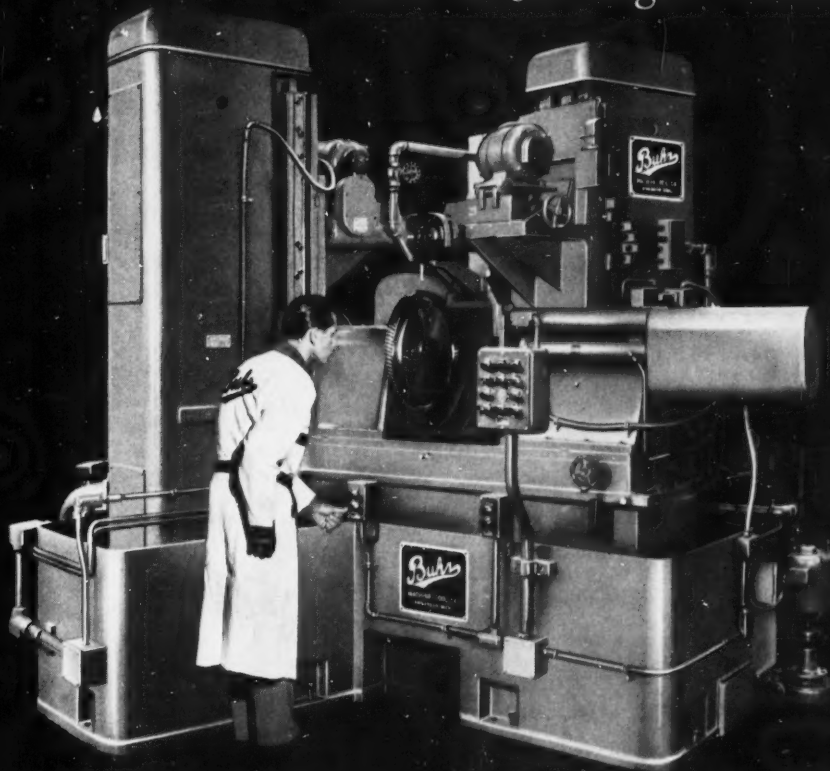
Centerless polishing and grinding machine made by Production Machine Co.



# *Buhr*

## SPECIAL...

Mills both ends of 57 up to 103 slots in 16  
different Jet Engine Rotors



Automatic 2-spindle milling machine, arranged with automatic index for milling both ends of dove-tailed slots.

Equipped with hardened and ground laminated tool-steel ways.

Hydraulic and electrical installations to J.I.C. standards.

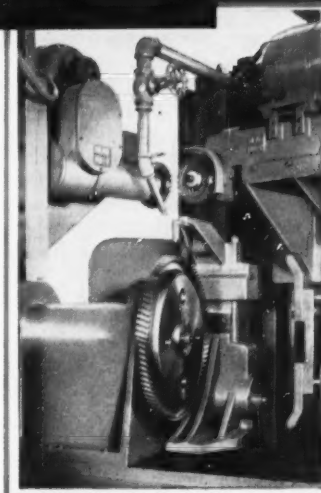
Automatic index unit arranged for milling the various stages from 57 up to 103 slots.

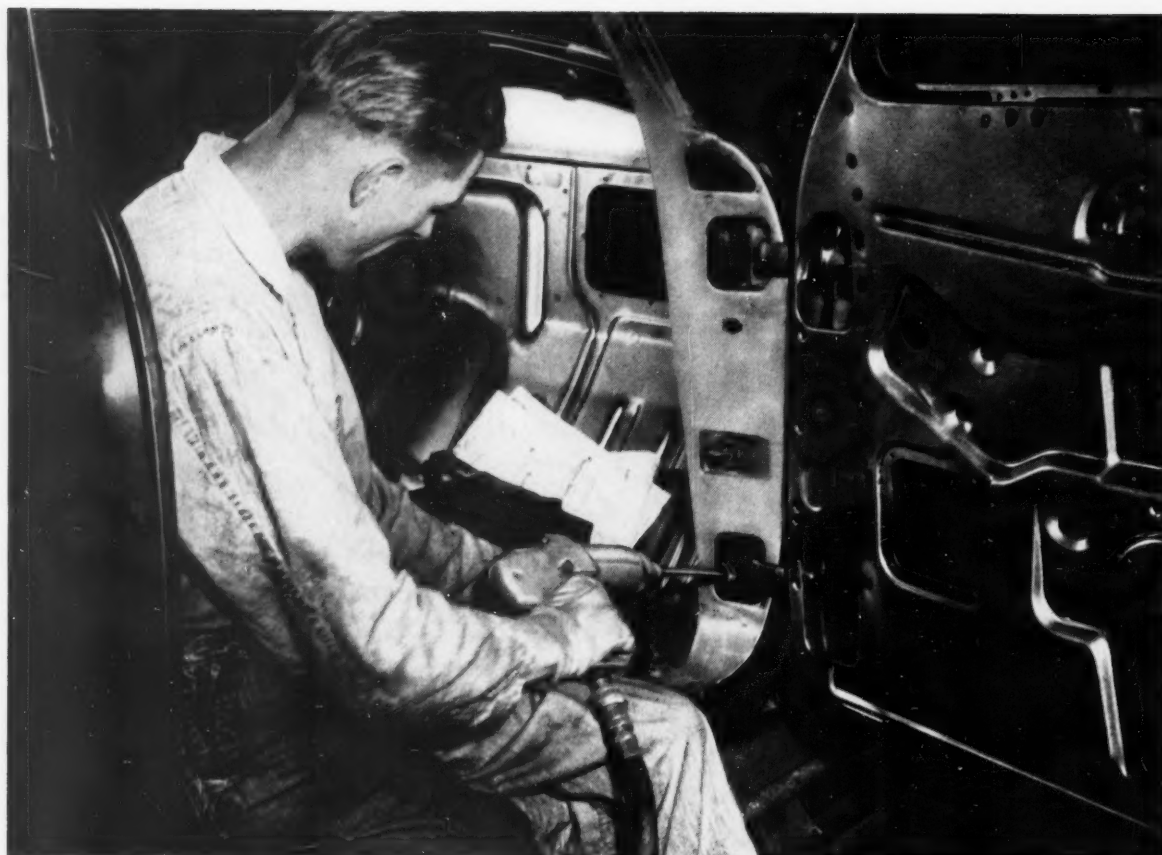
Once machine is set up for any one part, operation is fully automatic, including stop when part is finished.

**BUHR MACHINE TOOL CO.**  
ANN ARBOR, MICHIGAN

# *Buhr*

**MULTIPLE-SPINDLE  
HIGH PRODUCTION MACHINERY**





## How we opened the door to lower costs for Ford

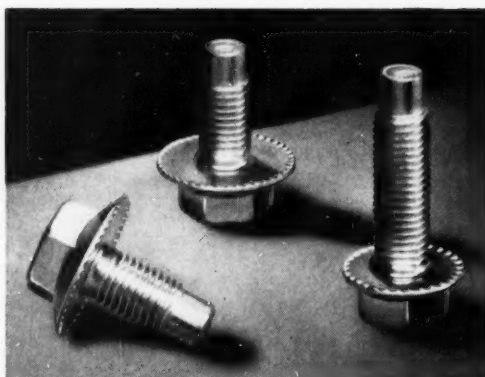
Two hinges on every Ford door. Six screws and 12 washers for each hinge.

Did this present an opportunity for cost reduction? An RB&W "fastener engineer" thought so. And after careful analysis and time studies Ford engineers agreed.

The solution: RB&W Hex SPIN-LOCK screws to fasten the hinge to the door, eliminating the need for washers. And special wide-flange Hex SPIN-LOCK screws for attaching the hinge to the frame, doing away with more washers. The wide flange is necessary to cover an elongated hole in which the hinge moves to permit accurate alignment.

Result — parts requirements are cut by two thirds, assembly is simplified, purchasing and inventory costs are lowered. And RB&W SPIN-LOCK screws hold those door hinges tight for good.

We will be glad to send an RB&W man around to check up on your fastening operations. Every problem is different, of course, but RB&W has a fastener for just about every job. If you need a "special", as Ford did, we'll design and make it for you. Write RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, New York.



**FASTER ASSEMBLY**, reduced costs were the pay-off, using RB&W designed wide-flange SPIN-LOCK screws (left) for door hinge. Other SPIN-LOCKS (right) hold hinge on door. SPIN-LOCK screws can't loosen because ratchet-like teeth lock into surface and hold tight.

3.10



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## NEW CATALOGUES

**WEIGHT CALCULATOR**—Chase Brass & Copper Co., Waterbury, Conn. Slide calculator for quickly computing the total weights of any one of four basic metals—copper, yellow brass, stainless steel, and aluminum in all standard diameters and thicknesses. It is available to purchasing agents and estimators of metal products upon business letterhead request direct to the above address.

**ALLOY CASTINGS**—International Nickel Co., Inc., New York City. Bulletin A-141, consisting of 48 pages of technical information on heat-resistant and corrosion-resistant alloy castings. Compositions regularly produced, with their applications, limitations, and types of service for which they are suitable, are discussed. Over 175 photographs illustrate applications of the alloy castings throughout industry. . . . . 1

**RESEARCH AT ALCOA**—Aluminum Company of America, Pittsburgh, Pa. 54-page booklet describing the work of the Aluminum Research Laboratories. The first section outlines the activities of the company's fourteen research divisions. Then follows a bibliographic section listing over 1000 publications prepared by Alcoa research scientists in the last thirty-five years. . . . . 2

**STAINLESS-STEEL BARS**—Republic Steel Corporation, Cleveland, Ohio. 93-page booklet entitled "How to Machine Republic Enduro Stainless Steel Bars," offering valuable information on machining Enduro stainless steel. Speeds, feeds, and estimating data for machining all types of stainless steel commonly used on automatics are given. Included is a section on correcting troubles encountered with cutting tools. . . . . 3

**ABRASIVE WHEELS**—Sandusky Abrasive Wheel Co., Inc., Kalamazoo, Mich. Catalogue describing the complete line of Sawco rubber and resin-rubber bonded grinding and cut-off wheels, mounted points, and abrasive sticks and blocks recommended for all types of light grinding, polishing, deburring, and tool sharpening applications, and most cut-off operations. . . . . 4

**AUTOMATIC PRESS-ROOM EQUIPMENT**—U.S. Tool Co., Inc., Ampere (East Orange) N.J. Bulletin 80, descriptive of the company's automatic press-room equipment—slide feeds, roll feeds, straighteners, stock reels, coil cradles, and scrap choppers. Also, the use of the U.S. Multi-Stop, a protective and inspection device, is illustrated. . . . . 5

**WORK ROLLS**—Metal Carbides Corporation, Youngstown, Ohio. Bulletin TB-3 entitled "Tallide Rolling Mill Work Rolls." The difference between Grade A and Grade B rolls is pointed out and information given regarding types of strip steel that can be satisfactorily rolled with each to obtain the proper finish. 6

**GAS REGULATORS**—Air Reduction Sales Co., New York City. Catalogue 806, containing 36 pages of specifications and operating data on cylinder, manifold, and pipe-line gas regulators. Also included are flow and pressure charts indicating at what point the regulators can be used to perform a particular job. . 7

**WHEEL FORMING ATTACHMENT**—Pratt & Whitney Division Niles-Bement-Pond Co., West Hartford, Conn. Circular 572, descriptive of the new Pratt & Whitney medium-sized Diaform wheel forming attachment for the form-truing of complex and irregular shapes up to 2 inches wide and 1 inch deep on any wheel up to 14 inches in diameter. . . 8

**CUTTING OIL BASES**—D. A. Stuart Oil Co., Ltd., Chicago, Ill. 16-page booklet detailing four cutting oil bases prescribed for tapping, threading, broaching, gear hobbing, automatic screw machine, and turret lathe work on a wide variety of metals. There is a section on machining operations and recommended cutting fluids. . . . . 9

**ZAGAR TOOLS**—Zagar Tool, Inc., Cleveland, Ohio. Booklet entitled "Here is What Zagar Tools Can Do For You," describing such products as gearless drill

heads, heavy clamping drill jigs, single and multiple feed units, special drilling machines, hydraulic broaching machines for machining medium and small parts, and collet fixtures. . . . . 10

**FLEXIBLE STAINLESS-STEEL TUBING**—American Brass Co., American Metal Hose Branch, Waterbury, Conn. Bulletin STC-1 on flexible stainless-steel tubing for conveying corrosive materials at high temperatures, as well as for absorbing vibration, compensating for misalignment, and connecting moving parts. . 11

**MODERNIZING DOUBLE CRANK PRESSES**—E. W. Bliss Co., Canton, Ohio. Bulletin 46, containing recommendations for the modernization and conversion of straight-side and cap-frame double-crank presses. Eighteen examples of conversion assemblies developed by Bliss are illustrated by "before" and "after" diagrams. . . . . 12

**IMPACT EXTRUSION DATA**—Aluminum Company of America, Pittsburgh, Pa. Booklet entitled "Alcoa Impact Fact Book," covering the significant facts necessary to design products as impact extrusions—what shapes can be produced, design facts, secondary operations, and finishes. Five tables are included. . . . 13

**HYDRAULIC POWER UNITS**—Ex-Cell-O Corporation, Detroit, Mich. Bulletin 45040, describing the new Ex-Cell-O quill type hydraulic power units used for advancing, feeding and retracting the cutting tools on special machines. The units have 3-H.P. capacity and 8- and 12-inch strokes, respectively. . . . . 14

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**CAP-SCREWS**—Standard Pressed Steel Co., Jenkintown, Pa. Folder 2002, on a new line of over-size Unbrako cap-screws of heat-treated alloy steel especially designed for large presses and the latest machine tools. The cap-screws are available in diameters of from 1 1/4 to 3 inches in lengths up to 12 inches. **15**

**CENTRAL FILTRATION**—Industrial Filtration Co., Lebanon, Ind. Folder presenting a report of a Delpark central filtration installation in the Warner & Swasey Co.'s New Philadelphia, Ohio, plant. The filters serve twenty-four machines doing a variety of small parts work. **16**

**JOB LAPPING FACILITIES**—Crane Packing Co., Chicago, Ill. Booklet L-407, descriptive of the lapping service available at the company's Morton Grove, Ill., plant. New and enlarged facilities have been developed to handle practically any requirements. **17**

**AUTOMATIC POSITIONER**—Fosdick Machine Tool Co., Cincinnati, Ohio. Bulletin describing the Fosdick automatic positioning table now available, as a separate unit, for use on radial drills. How to use the positioner is shown, step by step, to give exact reproduction of precision drilled, bored, tapped, and reamed parts. **18**

**INDUCTION MOTORS**—Reliance Electric & Engineering Co., Cleveland, Ohio. Bulletin B-2102, termed a "Motor Selector," listing performance characteristics, construction features, dimensions, prices, and other information helpful in selecting Reliance squirrel cage induction motors. **19**

**FLOW CONTROL VALVES**—Vickers, Inc., Detroit, Mich. Bulletin 53-35, describing Vickers "Microfeed" flow control valves for machine tool and welding machine oil-hydraulic systems. Flow control circuits, performance curves, and installation data are given. **20**

**CENTRIFUGAL PUMPS**—Ingersoll-Rand Co., New York City. Form 7123, consisting of a booklet in slide film format dealing with the selection of the proper motor pump for any specific job. A brief description is given of what a centrifugal pump is and how it works. **21**

**SURFACE GRINDERS**—Pratt & Whitney Division Niles-Bement-Pond Co., West Hartford, Conn. Circular 569, on the Pratt & Whitney Model "D" 14-inch hydraulic vertical surface grinder, a machine that will handle a wide variety of work sizes, shapes, and materials. **22**

**MAINTAINING AIR AND HYDRAULIC EQUIPMENT**—Logansport Machine Co., Inc., Logansport, Ind. Booklet in cartoon style dealing with the maintenance of air and hydraulic equipment, giving practical explanations of the right and wrong way in setting up and servicing fluid power equipment. **23**

**SINGLE-SPINDLE AUTOMATIC SCREW MACHINE**—Cleveland Automatic Machine Co., Cincinnati, Ohio. Bulletin describing six models of Cleveland single-spindle automatic screw machines, and explaining the uses for which each machine is best suited. **24**

**MILLING MACHINES**—Sundstrand Machine Tool Co., Rockford, Ill. Circular 66-1, illustrating some typical uses of Sundstrand Model 66 Rigidmil milling

machines. Also presented are the features of this machine, specifications, spindle speeds, table feeds, and table cycles. **25**

**SAFETY IN WELDING**—Air Reduction Sales Co., New York City. 32-page booklet on recommended safe practices in cutting and welding. The booklet is specifically designed for welding and cutting operators handling oxyacetylene and arc welding equipment. **26**

**TOGGLE SWITCHES**—Micro, Division of Minneapolis-Honeywell Regulator Co., Freeport, Ill. Catalogue 73a, covering nineteen precision snap-action toggle assemblies. Dimensions, operating characteristics, electrical ratings, and contact arrangements of each switch are outlined. **27**

**NICKEL-CHROMIUM STEELS**—International Nickel Co., Inc., New York City. Bulletin NS-5, presenting twenty-eight charts of concise information on the composition, heat-treatment, transformation, characteristics, and mechanical properties of AISI and S A E nickel-chromium steels. **28**

**METAL-WORKING FACILITIES**—Pivot Punch & Die Corporation, North Tonawanda, N. Y. 20-page catalogue, illustrating the company's services and available facilities for producing tools, dies, jigs, fixtures, gages, and special machinery; repairing and rebuilding machinery; and subcontracting. **29**

**MEEHANITE CASTINGS CHART**—Meehanite Metal Corporation, New Rochelle, N. Y. Calculating wheel chart, providing physical properties of the various types of Meehanite metals under four classifications—general engineering, heat-resisting, corrosion-resisting, and wear-resisting. **30**

**METAL CUT-OFF BAND SAWS**—Johnson Mfg. Corporation, Albion, Mich. Catalogue describing and illustrating the concern's line of metal cut-off band saws for handling all types of cutting—rods, tubes, angles, heavy rounds or flats, and irregular shapes. **31**

**TESTING INSTRUMENTS**—Baldwin-Lima-Hamilton Corporation, Philadelphia, Pa. Bulletin 4212, describing various dial-indicating extensometers for many purposes, such as testing specimens in tension and measuring elastic deformation of sheet metal and wire. **32**

**SINGLE-SPINDLE AUTOMATIC SCREW MACHINE**—Porter-McLeod Machine Tool Co., Inc., Hatfield, Mass. Leaflet descriptive of the Double-Matic single-spindle automatic screw machine which can handle both the front and back ends of work-pieces in a single cycle. **33**

**SURFACE GRINDER**—Thompson Grinder Co., Springfield, Ohio. Catalogue F53, explaining the features of the Thompson Type F 6- by 10- by 18-inch hydraulic surface grinder for tool-room and small parts production. A clearance diagram and a diagram of controls are included. **34**

**GEAR LAPPERS**—Michigan Tool Co., Detroit, Mich. Bulletin ML-54, on Michigan internal and external gear lappers. A concise explanation of the lapping process and its uses is given, and four gear lapping machines are illustrated and described. **35**

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<p>For more details on products mentioned in June editorial or advertising pages, fill in below:</p>	
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**CUTTER BLADE LOCK**—Wesson Co., Ferndale (Detroit), Mich. Folder 1-54-10M, descriptive of the Wesson Dual-Wedge Lock for locking or wedging milling cutter blades, broaching inserts, and tool bits. The construction of the lock is explained. .... 36

**METAL STAMPINGS**—Dayton Rogers Mfg. Co., Minneapolis, Minn. Folder showing typical metal stampings produced by Dayton Rogers, as well as describing the company's small-lot stamping service with four examples itemizing the production cost of each. .... 37

**BROACHING MACHINE**—Colonial Broach Co., Detroit, Mich. Bulletin RP-54, describing the "Ram-Press" line of broaching machines for surface-broaching, internal push broaching, internal pull broaching, and press work. Shown are a few typical applications. .... 38

**AUSTENITIC STAINLESS STEELS**—International Nickel Co., Inc., New York City. Bulletin A-162, consisting of a 36-page reprint entitled "Effect of Temperatures on the Mechanical Properties, Characteristics, and Processing of Austenitic Stainless Steels." .... 39

**PERFORATED STEEL SHEETS AND PLATES**—Joseph T. Ryerson & Son, Inc., Chicago, Ill. Bulletin 50-2, illustrating various patterns of perforated steel sheets and plates that are available from stock for screening, ornamental, and other purposes. .... 40

**TURRET DRILLING MACHINE**—Howe & Fant, Inc., East Norwalk, Conn. Bulletin 5403, descriptive of the Howe & Fant turret drilling machine that completes up to six different drilling and tapping operations at a single station with one handling of the work. .... 41

**TOOL HOLDER**—Brookfield, Inc., Boston, Mass. Folder descriptive of the Brookfield tool-holder, designed to hold drills, counterbores, reamers, and other tools in a wide range of diameters without the use of bushings or other accessory equipment. .... 42

**WEIGHT-BALANCE MILLING MACHINE**—Motch & Merryweather Co., Cleveland, Ohio. Bulletin 2100, showing three models of Motch & Merryweather automatic weight-balance milling machines being used in machining automotive connecting-rods. .... 43

**ADHESIVES, COATINGS, AND SEALERS**—Adhesives and Coatings Division, Minnesota Mining & Mfg. Co., Detroit, Mich. Booklet listing 3M adhesives, coatings, and sealers classified by United States Government specifications. Old and new specification numbers are correlated. 44

**POWER TRANSMISSION BELT**—Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J. Folder descriptive of the Poly-V drive, a single, endless rubber belt with a series of parallel V-ribs molded lengthwise around the inside circumference. .... 45

**UNIVERSAL TESTING MACHINES**—Baldwin-Lima-Hamilton Co., Philadelphia, Pa. Bulletin 4213, describing two low-cost Baldwin-Tate-Emery universal testing machines of 20,000- and 60,000-pound capacity. Principles of operation are outlined. .... 46

**REAMERS**—Twentieth Century Mfg. Co., Libertyville, Ill. Bulletin 10 on chucking reamers, listing them in decimal and fractional sizes. Folder on stub reamers, in

decimal sizes, for screw machines, turret lathes, and drill presses. .... 47

**VISUAL CONTOUR-GRINDING MACHINE**—Cleveland Grinding Machine Co., Cleveland, Ohio. Folder descriptive of the Visual-Grind machine for contour grinding. An optical system permits continuous inspection during grinding. . 48

**PISTON RING LAPPER**—C. Allen Fulmer Co., Cincinnati, Ohio. Folder descriptive of the Fulmer hydraulic machine for lapping full sets of rings into their cylinder barrels up to a maximum bore of 6 1/2 inches. .... 49

**VAPOR COLLECTOR**—Aget-Detroit Co., Ann Arbor, Mich. Bulletin 640-3, showing a Dustkop vapor collector installation which was suspended from the ceiling over a group of centerless grinders in a Midwestern grinding shop. .... 50

**PRESSURE BLASTING**—Cro-Plate Co., Inc., Hartford, Conn. Booklet describing the company's regular-velocity and high-velocity pressure blasting process and its applications in the field of deburring, cleaning, and scale removal. .... 51

**PORTABLE ELECTRIC TOOLS**—Precise Products Corporation, Racine, Wis. Catalogue FGH-1, covering the company's complete line of portable electric grinders, millers, power quills, machine tool mounts, and accessories. .... 52

**SURFACE GRINDERS**—Reid Brothers Co., Beverly, Mass. Folder descriptive of the Model 618 surface grinder, explaining the features of the grinder. The available attachments and accessories are shown. .... 53

**AUTOMATIC FORM GRINDING MACHINES**—Gear Grinding Machine Co., Detroit, Mich. Specification sheets giving factual data on the six principal models of Geargrind machines for work on gears, spline shafts, and also specially contoured parts. .... 54

**BALANCING MACHINES**—R. B. Annis Co., Indianapolis, Ind. Leaflets descriptive of Annis balancing machines—an under-drive balancer, the Dynograph balancer, and a rotating type single-plane balancer. .... 55

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**TITANIUM TUBING**—Superior Tube Co., Norristown, Pa. Bulletin 42, presenting data on the properties of titanium, applications, and advantages. Examples of products using titanium tubing are given. . . . . 56

**HONING MACHINES, PISTON RING LAPPERS, AND ROD BORERS**—C. Allen Fulmer Co., Cincinnati, Ohio. Folder descriptive of the company's line of precision tools—honoring machines, piston ring lappers, and rod borers. . . . . 57

**TURRET LATHE CENTERS**—Ready Tool Co., Bridgeport, Conn. Catalogue giving complete information on the new Red-E turret lathe center, as well as other types of centers made by the company. . . 58

**PRESS BRAKES**—Service Machine Co., Inc., Elizabeth, N. J. Folder describing and illustrating Semco press brakes, and showing some standard brake dies. . 59

**TURRET LATHES**—Warner & Swasey Co., Cleveland, Ohio. Booklet describing the improved design features built into

Warner & Swasey turret lathes, such as a simplified headstock, a positive locating and locking mechanism for the turret, and a sixteen-speed drive providing a new range of spindle speeds. . . . . 60

**STRETCH-FORMING**—Cyril Bath Co., Solon, Ohio. Design Engineers' Bulletin 1, presenting an application of the Bath contour former in solving a particular metal-forming problem. . . . . 61

**BARREL FINISHING**—Abbott Ball Co., Hartford, Conn. Folder explaining the Abbott method of barrel finishing and describing an improved tumbling barrel. . . . . 62

**HEAVY-DUTY LIMIT SWITCH**—R. B. Denison Mfg. Co., Cleveland, Ohio. Bulletin LS54A on the Loxswitch, a heavy-duty limit switch with trigger type mechanism. . . . . 63

**CLAMPS**—Cincinnati Tool Co., Cincinnati, Ohio. Catalogue C-50, furnishing selection and application information on all types of Hargrave clamps. . . . 64

**TAP CHAMFER GRINDER**—Edward Blake Co., West Newton, Mass. Folder explaining what the Blake tap chamfer grinder does and how it operates in salvaging taps by sharpening them for reuse. . . . . 65

**GLASS-FIBER LAMINATES**—Lunn Laminates, Inc., Huntington Station, Long Island, N. Y. 24-page comprehensive study of glass-fiber laminates for the manufacture of shell type structures, pointing out their advantages. . . . 66

**PLATING EQUIPMENT**—Udylite Corporation, Detroit, Mich. 25-page catalogue describing the company's complete line of plating and metal-finishing equipment, supplies, processes, and service. . . . 67

**O-RINGS**—Goshen Rubber Co., Inc., Goshen, Ind. Booklet on O-rings, giving detailed information on sizes, groove dimensions, and compounds. Diagrams of typical applications are included. . . 68

**DRILL GRINDER**—Black Diamond Saw & Machine Works, Natick, Mass. Folder on the Black Diamond precision drill grinder for small drills. The four steps required to operate the grinder are explained. . . . . 69

**CENTRALIZED LUBRICATION**—Farval Corporation, Cleveland, Ohio. Folder showing typical Farval Dualine systems of centralized lubrication serving various western steel plants. . . . . 70

**DUPLICATE PATTERN MATERIALS**—Cerro de Pasco Corporation, New York City. Bulletin on the use of Cerro alloys in duplicating wood patterns for constructing aluminum match plates. . . 71

**CYLINDERS**—Petch Mfg. Co., Alpena, Mich. 32-page catalogue giving specifications and engineering data regarding air and both high- and low-pressure hydraulic cylinders. . . . . 72

**SPEED INDEXERS**—Erickson Tool Co., Cleveland, Ohio. Folder describing the new Model 450 rotary indexing table designed for use in a vertical position where limited height is a factor. . . . 73

**TOOLPOSTS**—Lodge & Shipley Co., Cincinnati, Ohio. Chip Tips 44, descriptive of the Alaris quick-change toolpost and tool-holders for use on Lodge & Shipley lathes. . . . . 74

**VICES**—Wilton Tool Mfg. Co., Chicago, Ill. General Catalogue 110, describing the many types of vises, clamps, and positioning devices produced by the company. . . . . 75

**LAPPING MACHINES**—Spitfire Tools Co., Chicago, Ill. Bulletin covering the company's line of flat lapping and roller lapping machines and giving pertinent data on their operation. . . . . 76

**CAM CLUTCHES**—Morse Chain Co., Detroit, Mich. Catalogue C12-54, describing the Series 200 cam clutches for indexing, over-running, and backstop machine-drive applications. . . . . 77

**UNIVERSAL SPEED REDUCERS**—Euclid Universal Machine, Inc., Wickliffe (Cleveland) Ohio. Catalogue 254, on an enlarged line of Euclid universal speed reducers. . . . . 78

**PRECISION DIE SETS**—Die Supply Co., Cleveland, Ohio. Bulletin 71, describing the steps involved in the manufacture of Dieco stock size die sets. . . . . 79

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This card is valid after September 1, 1954 M-6/54

PLEASE SEND US MORE INFORMATION. Circle below item numbers on which you wish further information.

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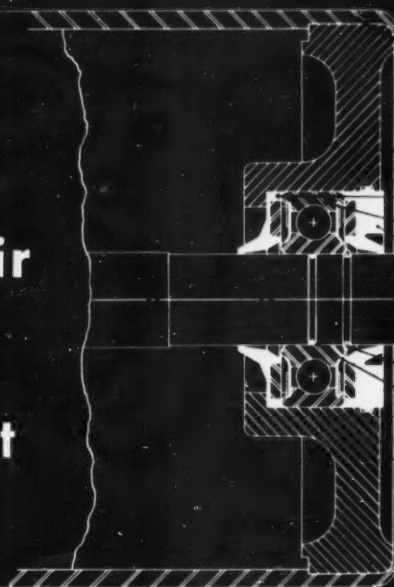
For more details on products mentioned in June editorial or advertising pages, fill in below:

PAGE	PRODUCT
PAGE	PRODUCT
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TITLE	
COMPANY	
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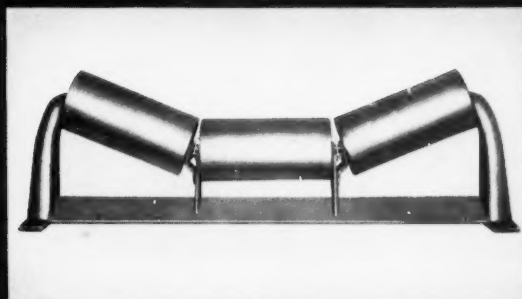
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# Trouble Fixed Fast...

## by Transall-Fafnir Idler Roll Development



HEAVY DUTY  
STEEL ROLL SHELL  
  
ROLL HEAD  
  
INNER  
RESILIENT SEAL  
  
FAFNIR PLY-SEAL  
BALL BEARING  
  
OUTER  
RESILIENT SEAL  
  
SHAFT  
  
BEARING  
RETAINING RING  
  
MOUNTING RING



The all steel, jig welded frame of this troughing idler insures roll alignment and facilitates belt training. Each idler roll is equipped with two Fafnir Ply-Seal Bearings.



Fafnir-equipped Transall Conveyor for Mine Run Coal. In daily operation since December 1949 . . . 2600 bearings without a bearing failure to date.

Things began to happen when Transall Designers asked Fafnir Engineers to join them in solving a troublesome conveyor problem. By pooling their experience, the answer was found quickly and simply . . . an improved idler roll with advantages beyond anything available.

Right from the start, the problem was simplified by centering development around Fafnir Ply-Seal Ball Bearings. Factory lubricated and sealed for operation between  $-60^{\circ}\text{F}$ . and  $+200^{\circ}\text{F}$ , Fafnir Ply-Seal Bearings never need relubrication. The seals are unaffected by moisture and many other contaminants.

Extra insurance against abnormally severe conditions was provided by chrome plating the bearing inner ring to prevent corrosion and abrasion at the

point of seal . . . and by the addition of supplementary, resilient bearing closures.

It's another example of the Fafnir "attitude and aptitude" . . . a way of looking at bearing problems from the designer's viewpoint and the ability to supply the right bearing for the need. If you have a bearing problem, why let it drag. Bring it to Fafnir like most people do. Maybe your trouble can be fixed fast. The Fafnir Bearing Company, New Britain, Conn.

## FAFNIR BALL BEARINGS

MOST COMPLETE

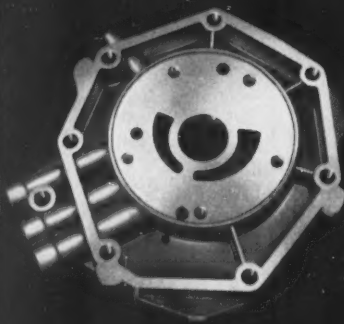
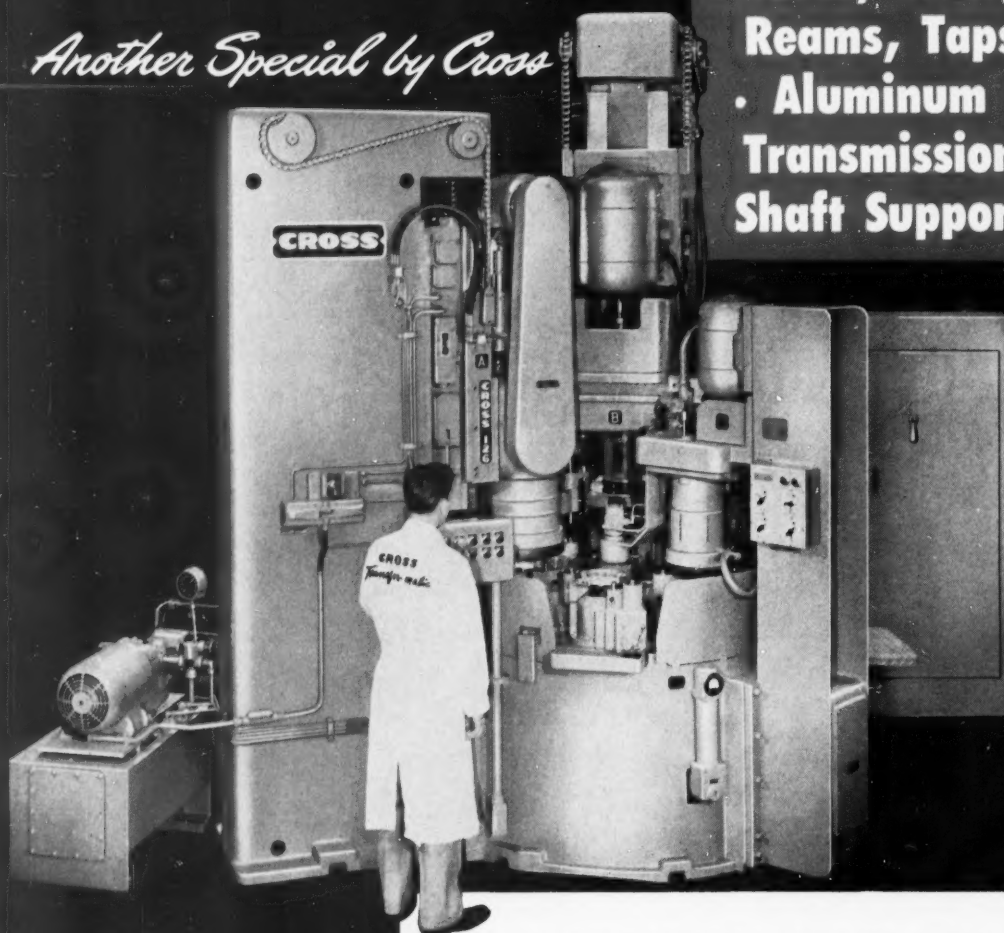


LINE IN AMERICA



*Another Special by Cross*

**Bores, Drills,  
Reams, Taps  
• Aluminum  
Transmission  
Shaft Support**



- ★ Turns rear face and counterbores large pilot diameter, drills 6 holes, drills and reams 2 locating holes, chamfers and taps 5 holes.
- ★ 128 aluminum castings per hour at 100% efficiency.
- ★ 6 station fluid motor driven index table with 1 loading and 5 working stations.
- ★ Hydraulic power clamping for work holding fixtures.
- ★ Complete interchangeability of all standard and special parts for easy maintenance.
- ★ Other features: Hydraulic feed and rapid traverse; hardened and ground ways; filtered coolant system; construction to J.I.C. standards; automatic work cycle.

Established 1898

THE **CROSS** CO.  
DETROIT 7, MICHIGAN  
*Special* MACHINE TOOLS





By E. S. Salichs

### That Cream Dream

In sponsoring its 1954 model car competition for American teen-agers, the Fisher Body Craftsman's Guild opened the field to models of sports cars, hardtops, convertibles, station wagons, and two- and four-door sedans. Entries began to arrive in Detroit (called the "birthplace of the classy chassis" in the news release) well before the deadline, June 1.

### Mr. Thomas Tells Us

Upon retiring from everyday work, one of our subscribers, Albert M. Thomas, wrote to us explaining how helpful MACHINERY had been to him down through the years. To quote: "It has been the means of my gaining many citations of merit along with appreciable cash awards. Best of all, it has assisted me in gaining from the City of New York two patents for devices used on subway cars."

### And Shoulder to Wheel

A national meeting of the American Society of Engineering Education will close with an address, "The Dignity of Dirty Hands." Then the Society will conduct a summer school session at the University of Illinois for teachers of machine design and manufacturing processes. The teachers, however, will be expected to use their heads, not hands.

### K.P. Salute?

In the GM Frigidaire Division's "Kitchen of Tomorrow," wall cabinets are featured that glide down to within easy reach at a wave of the hand.

### 012345

Clerical employees at the Minneapolis-Honeywell Philadelphia plant are going back to school on company time to brush up on their handwriting skills, particularly in

forming numbers. Despite electronic robots now in use, basic records and day-to-day statistical accounts are still recorded by hand—and not too efficiently it would seem.

### Tunes at Times

An early Eighteenth Century "juke box" clock has been put into perfect working order for display in the James Arthur Collection of Clocks and Watches at New York University. The clock plays twelve tunes—a different one on each hour. An unusually heavy system of weights, totaling 200 pounds, is required to activate the time, striking, and musical systems.

### Muster the Medulla

Members of the American Society of Mechanical Engineers can win \$500 in a contest for the best slogan and the best symbol for the Society's seventy-fifth anniversary coming up in 1955.

HE WHITTLED WHILE WAITING FOR WHITWORTH—Drat it, why don't they make these candle butts all the same size? So spoke our friend as he shaved and shivered. The sentiment, burning in the hearts of Englishmen back in the 1800's, was capitalized on by Joseph Whitworth, who preached standardization as a means of obtaining interchangeability, illustrating his point by means of candle butts and candlesticks. Sir Whitworth went on to develop a system of standard gages for British industry and the Whitworth Thread. This, and other such stories, is told in "Through History with Standards," a booklet published by The American Standards

Association, New York City



# News OF THE INDUSTRY

## California and Colorado

GEORGE T. FRASER has been appointed western sales manager for Rem-Cru Titanium, Inc., Pittsburgh, Pa., a newly created position. Mr. Fraser will have his headquarters in Los Angeles, Calif. In addition to these duties, he will also serve the Crucible Steel Company of America as the western area sales manager.

ROBERT M. SIMPSON has been named assistant manager of the San Francisco, Calif., sales branch of the Crucible Steel Company of America, Pittsburgh, Pa. Mr. Simpson joined the company in 1941 and has held various metallurgical positions.

RICHARD COLVIN will represent the Lufkin Rule Co. in Colorado and several other Mountain States. Mr. Colvin will have his headquarters in Denver.

## Illinois and Indiana

ERNEST J. SVENSON, executive vice-president and general manager of the John S. Barnes Corporation, Rockford, Ill., was recently elected president and general manager. In 1929, Mr. Svenson helped in the organization of the firm. He holds more than 200 patents pertaining to mechanical, electrical, hydraulic and metallurgical structures. Mr. Svenson



Ernest J. Svenson, new president and general manager of the John S. Barnes Corporation

son was assistant chief engineer for the General Electric Co. in Vasteras, Sweden, in 1920 when he decided to come to the United States on a scholarship. With the formation of the John S. Barnes Corporation, he became vice-president and chief engineer, and later executive vice-president and general manager. WILLIAM W. BARTON, who was president, was elected chairman of the board. Other executive appointments were the promotion of WEBB F. MALONE, sales manager for the Industrial Hydraulics Division, to assistant vice-president for industrial hydraulics; S. HERBERT STONE, engineer and sales manager for the Automotive Hydraulics Division to assistant vice-president for automatic hydraulics; and K. L. FINKENSTAEDT, secretary, to vice-president.

JAMES A. MUNRO, formerly manager of the work order department at the Detroit, Mich., plant of Joseph T. Ryerson & Son, Inc., Chicago, Ill., has been appointed assistant manager of the structural fabricating division at the Chicago plant. ROBERT H. HERING succeeds Mr. Munro at Detroit. Mr. Hering was formerly a sales representative in northern Michigan.

BARBER-COLMAN Co., Rockford, Ill., announces the appointment of the following men: HOWARD A. NELSON, administrative assistant to the sales manager in the Machine and Small Tool Divisions; NELS O. THORNBLOOM, chief engineer of machine tool sales; and STUART J. JOHNSON, chief engineer of the Small Tool Division.

FORD SEBASTIAN has joined the Williams Mfg. Co. Chicago, Ill., having been elected vice-president and general manager of the newly formed Sealelectric Division. Mr. Sebastian was formerly executive vice-president of the Electro-Snap Switch & Mfg. Co., also of Chicago.

JAMES M. MEAD, assistant vice-president of Joseph T. Ryerson & Son, Inc., Chicago, Ill., has been elected a vice-president and director, succeeding AINSLIE Y. SAWYER, who is retiring after forty-six years of service. Mr. Mead has been with Ryerson since 1919. He became a general sales representative in New York and northern New Jersey, and in 1938 was appointed assistant manager of the Philadelphia plant,



James M. Mead, who has been elected a vice-president and director of Joseph T. Ryerson & Son, Inc.

where he later became manager. Subsequently, he became manager of the New York plant, and in 1952, was promoted to assistant vice-president with headquarters at Chicago, the post he held until now. In his new executive capacity, he will be in charge of procurement for the company's sixteen steel service plants.

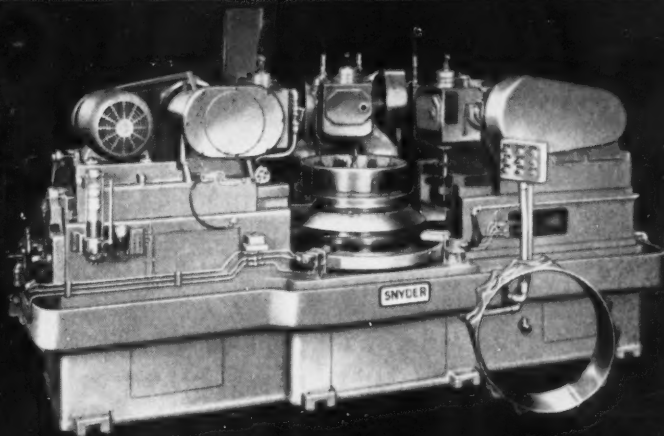
RAYMOND B. KROPP, executive vice-president and treasurer of the Kropp Forge Co., Chicago, Ill., was recently elected chairman of the board and chief executive officer. JOHN H. NELSON has been named works manager of the Chicago plant. He was formerly assistant plant manager.

R. A. HASTINGS has joined the Lindberg Engineering Co., Chicago, Ill., and will be head of the sales department of a new division. ROBERT A. FOLEY has been named salesman for the Chicago district office.

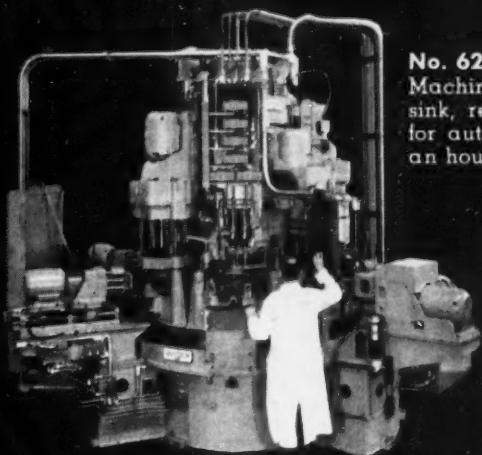
ECONOMY STEEL SERVICE Co. has been organized by JACK SPEAR, specializing in the sales and processing of sheet mill and precision strip mill coiled steel. The new company is located at 1832 W. Irving Park Blvd., Chicago, Ill.

BARRETT-CRAVENS Co., material-handling equipment manufacturer, has moved to its new plant at 630

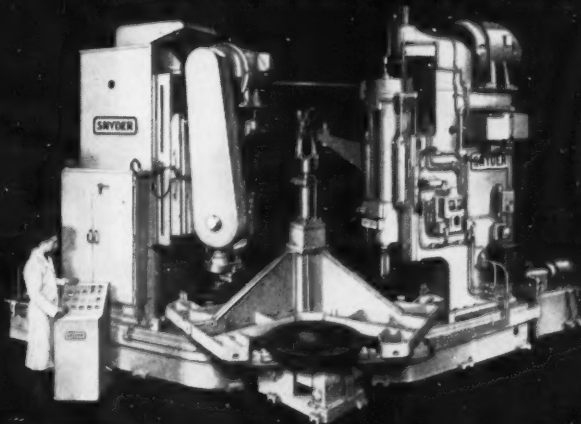
**No. 68326**—A three-way machine to profile mill four rows of lugs on a compressor casing for jet engines. 135 minutes are used to perform this operation in 3 steps.



**No. 62207**—Six Station Center Column Machine to drill, counterbore, counter-sink, ream and tap converter housing for automatic transmissions. 91 pieces an hour at 80% efficiency.



**No. 67677**—Two-Station, Vertical Column, Boring and Facing Machine to rough bore and face the hub of heavy railroad car wheels. Bore  $6\frac{1}{4}$ " x 7" long. 33 units an hour at 100% efficiency.



## **SPECIALS by SNYDER**

**TOOL & ENGINEERING COMPANY**  
3400 E. Lafayette, Detroit 7, Michigan

*29 Years of Successful Cooperation  
with Leading American Industries*

Dundee Road, Northbrook, Ill. Also located here will be the Barrett Electronics Corporation.

BOYAR - SCHULTZ CORPORATION, Chicago, Ill., is completing a new building, to be occupied about August 1 by the general offices and manufacturing plant, at 2000 25th Ave., Broadview, Ill.

ELGIN NATIONAL WATCH CO., Elgin, Ill., announces that its Abrasives Division will now market a line of rotary cutting and grinding tools under the "Gold Circle" trademark.

J. M. HILEMAN, fabricating division staff assistant, has been named works manager at the Richmond, Ind., works of the Aluminum Company of America, Pittsburgh, Pa. Mr. Hileman has been with Alcoa for thirty-two years.

### Maryland, Kentucky, and Tennessee

ERIC J. FANTON and HARRY N. PATRONIK have joined the engineering staff of the dust control department of the Pangborn Corporation, Hagerstown, Md. Mr. Fanton was dust control design and development engineer for Pangborn while Mr. Patronik was a dust control application engineer.

TOOLS & DIES, INC., formerly the Fortwengler Die & Machine Co., have moved to new quarters at Eiler Ave. near Strawberry Lane, Louisville, Ky. The concern's mailing address is Route 2, Box 975, Louisville 14.

SAFETY SOCKET SCREW CO., Chicago, Ill., has appointed JOHN T. EVERETT & Co., Memphis, Tenn., as southern and southwestern sales representatives.

### Michigan

JOSEPH T. RYERSON & SON, INC., Chicago, Ill., is constructing a building at 6500 7 Mile Road, East, Detroit, Mich., to be occupied by the concrete reinforcing steel division. The new unit will operate as a branch of the company's main plant at 1600 E. Euclid Ave., Detroit. WILLIAM G. MURRAY will head operations of the branch from his headquarters in the Euclid Avenue plant, where he is manager of the reinforcing steel department.

WILLIAM F. WILSON has been appointed works manager of the Gear Grinding Machine Co., Detroit, Mich., and will be in charge of manufacturing operations in the company's Joint Division, Gear Division, and Machine Tool Division. Mr.



William F. Wilson, who is joining the Gear Grinding Machine Co. as works manager

Wilson comes to the company from the Walker-Turner Division of Kearney & Trecker Corporation, where he was works manager for over four years.

EATON MFG. CO., Cleveland, Ohio, announces the creation of a new division which will be known as the Aircraft Division. It will be located in Battle Creek, Mich., adjacent to the present Valve Division of the company. JOHN F. ROMANS, formerly on the Cleveland staff, has been appointed general manager.

PAUL B. BROWN was recently made a director of the Abrasive Metal Products Co. and appointed president and general manager of the Peninsular Grinding Wheel Division, and president of the Peninsular Grinding Wheel Sales Corporation, a subsidiary, Detroit, Mich.

CAMCAR SCREW & MFG. CORPORATION, Rockford, Ill., manufacturer of metal fasteners, has opened a district office at 16239 James Couzens Highway, Detroit, Mich. ROLLIN C. RING and CHARLES C. CURRY, factory sales representatives, will staff the office.

S. STERLING CO., has been appointed representative in Michigan and Ohio by the BALDWIN-LIMA-HAMILTON CORPORATION, Philadelphia, Pa. The representative has offices at 15310 W. McNichols, Detroit, Mich.; and 13431 Cedar Road, Cleveland, Ohio.

MORSE CHAIN CO., Detroit, Mich., has named the following distributors: SERVICE POWER TRANSMISSION CO., 13-01 Fifth St., Fair Lawn, N. J.; and NAVARRO SUPPLY CO., Pecos, Tex.

CARL J. OXFORD, chief engineer for more than thirty years of the National Twist Drill & Tool Co., Rochester, Mich., has been elected to the board of directors.

GEORGE DOIG has joined Numatics Operating Valves, Milford, Mich., in the capacity of sales manager.

### New England

FREDERICK W. MCINTYRE, JR., vice-president, has been elected president of the Reed-Prentice Corporation, Worcester, Mass., manufacturer of machine tools, die-casting machines, and plastic injection molding presses. He assumed this position when FREDERICK W. MCINTYRE, SR., who was president since 1944, was elected chairman of the board of directors. DONALD H. DALBECK, controller and treasurer, was elected to the post of vice-president and a director, while IVER G. FREEMAN was named a vice-president. Mr. Freeman was formerly with the Norton Co. for thirty-eight years.

HUGH T. PRICE, JR., was recently made factory manager of the Grinding Machine Division of the Norton Co., Worcester, Mass. He replaces IVER G. FREEMAN, who joined the Reed-Prentice Corporation. Mr. Freeman was in the Grinding Machine Division for thirty-eight years. ROLAND T. NELSON assumes Mr. Price's former position of production manager, while OSCAR A. ERICKSON replaces Mr. Nelson as planning engineer.

PARKER N. WHEELER, who was manager of the Unisorb Division of the Felters Co., Boston, Mass., has been assigned to the Jackson, Mich., plant where he will be in charge of market development work. JAMES W. MORRISON has been appointed to the post vacated by Mr. Wheeler. Mr. Morrison was Philadelphia branch manager for the company.

LODDING, INC., Worcester, Mass., has named the following representatives to handle its line of jig and fixture components: WESTERN TOOL & SUPPLY CO., 285 Fifth St., Oakland, Calif.; PRECISION TOOL SALES, 2500 W. Sixth St., Los Angeles, Calif.; and DE EUGENIO TOOL CENTER, 119 S. Eleventh Ave., Phoenix, Ariz.

W. W. FRYMOYER has been named vice-president of the Foxboro Co., Foxboro, Mass. He has been with the company since 1926, for the last three years as factory manager, a position he will continue to hold.

HARVEY J. FINISON has joined the National Pneumatic Co., Inc., and Holtzer-Cabot Divisions, Boston,

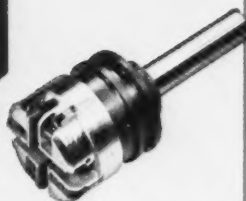
(Continued on page 259)



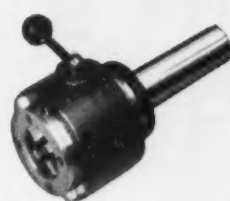
# *Reduce* **THREAD COSTS** and *Increase* **THREAD QUALITY** with **MURCHEY TOOLS**



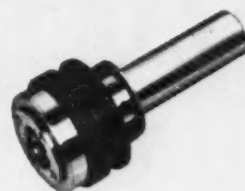
Precision-Pak with die heads and collapsible taps automatically taps holes up to 4" dia., cuts external threads up to 3½" dia.—also bores and reams. Lead accuracy assured by precision lead screw.



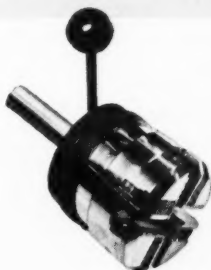
Rotating Die Heads, Type "ORB" with snap action trip and quick change radial type chasers, cut straight threads ¼" to 5" dia.



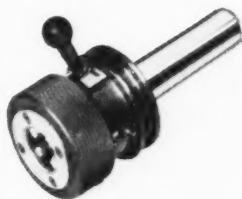
Non-rotating Die Heads, Type "OLB" with pull off snap trip and quick change radial type chasers, cut straight threads ¼" to 5" dia.



Rotating Die Heads, Type "TRB" with snap action trip and quick change Tangent chasers, cut straight threads ½" to 2" dia.



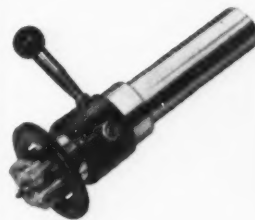
Non-rotating Tangent Die Heads, Type "TLC" with pull-off snap trip and quick change chasers, cut straight threads ¾" to 2" dia.



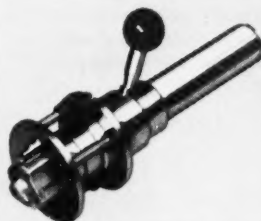
New 4 in 1 Type "ACB" Die Heads, Rotating and Non-Rotating feather action trip, cut straight threads ¼" to 4" and tapered pipe threads ¼" to 3½".



Solid Adjustable Taps "EHB" and "RHB" with removable chasers, cut threads 1¼" to 5" dia.—ideal for salvage work.



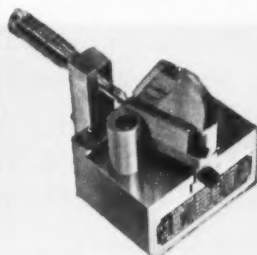
Standard Collapsible Machine Taps, Rotating or Non-Rotating, with easy size adjustment, cut straight threads 1¼" to 7" dia.



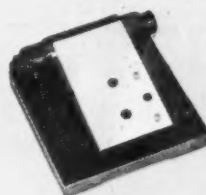
Semi-receding Pipe Taps, Rotating or Non-Rotating, with taper receding action, cut 1" to 6" taper pipe threads. May be arranged for straight threads also.



Type "L" Machine Taps, Rotating or Non-Rotating, with 18 interchangeable nose pieces and 2 bodies, cut a range of straight threads to 6¾" dia.



Tangent Chaser Micrometer Setting Fixture provides longer chaser life and better threads through more accuracy in setting chasers in their holding blocks.



Universal Chaser Grinding Fixture for use on either a surface or cutter grinder assures accuracy in grinding chasers of all types.

For more complete information on Sheffield-Murchee threading tools, get in touch with your local representative or write for Catalog MU-153.



# SHEFFIELD

Murchee Division, The Sheffield Corporation  
Dayton 1, Ohio, U. S. A.

6548

**NOW 4 TYPES**

**295 SIZES**

**Starrett®**

precision ground

**FLAT STOCK**

AND

**DIE STOCK**

**NO. 497 AIR HARDENING**

**NO. 496 OIL HARDENING**

**NO. 495 OIL OR WATER HARDENING**

**NO. 495 WATER HARDENING**



Save time. Save money. Save valuable man and machine hours. Use Starrett precision ground Die and Flat stock for all precision parts, pieces, punches, dies and special tools having two flat, parallel sides. Just select the right type and size of flat stock from the complete Starrett line . . . lay it out . . . and saw it out. (For best cutting, use Starrett Band Saws.)

Keep a supply of frequently used sizes in the tool crib . . . or call your Industrial Distributor for prompt, dependable, quality service.

**LOOK FOR THE MARK  
OF PRECISION**

**Starrett®**

**ON EVERY PIECE**

Each piece is marked for type and size and individually packaged in a protective envelope showing chemical analysis, hardening and tempering information.

**WRITE FOR NEW FOLDER  
AND WALL CHART**

listing the 295 sizes available and giving hardening formulas for the four types. Address Dept. D.



**Starrett**  
TRADE MARK  
REG. U.S. PAT. OFF.  
SINCE 1880  
WORLD'S GREATEST TOOLMAKERS

**THE L. S. STARRETT COMPANY**  
Athol, Massachusetts, U. S. A.

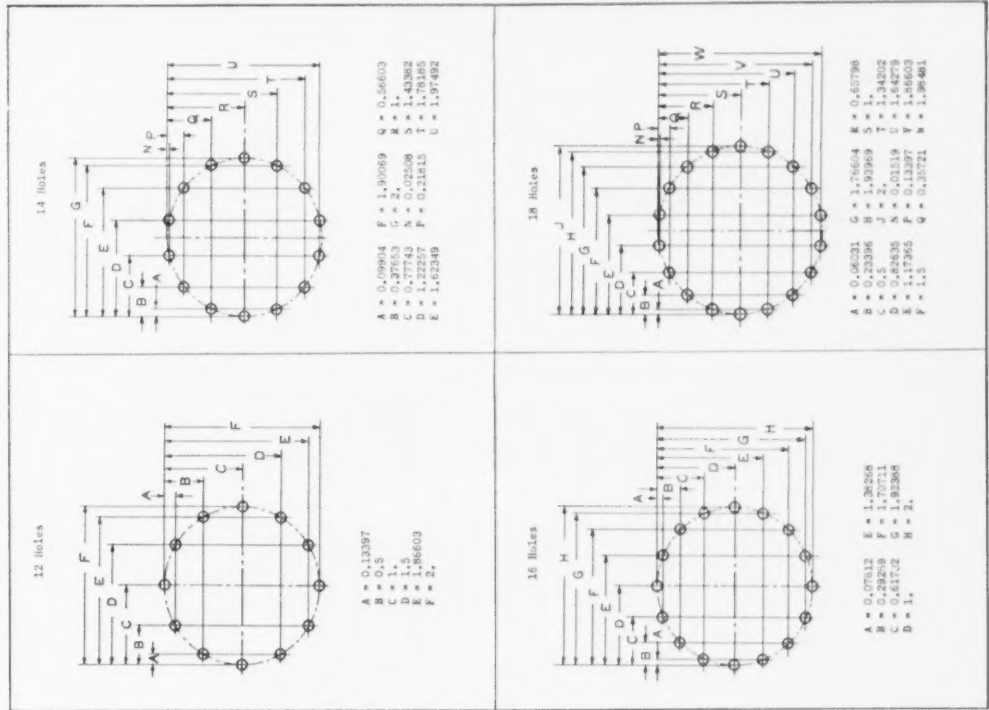
MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS  
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK  
HACKSAWS, BAND SAWS and BAND KNIVES

**Buy  
THROUGH YOUR  
INDUSTRIAL  
DISTRIBUTOR**

Prompt delivery  
Dependable service  
Quality products

# MACHINERY'S DATA SHEETS 755 and 756

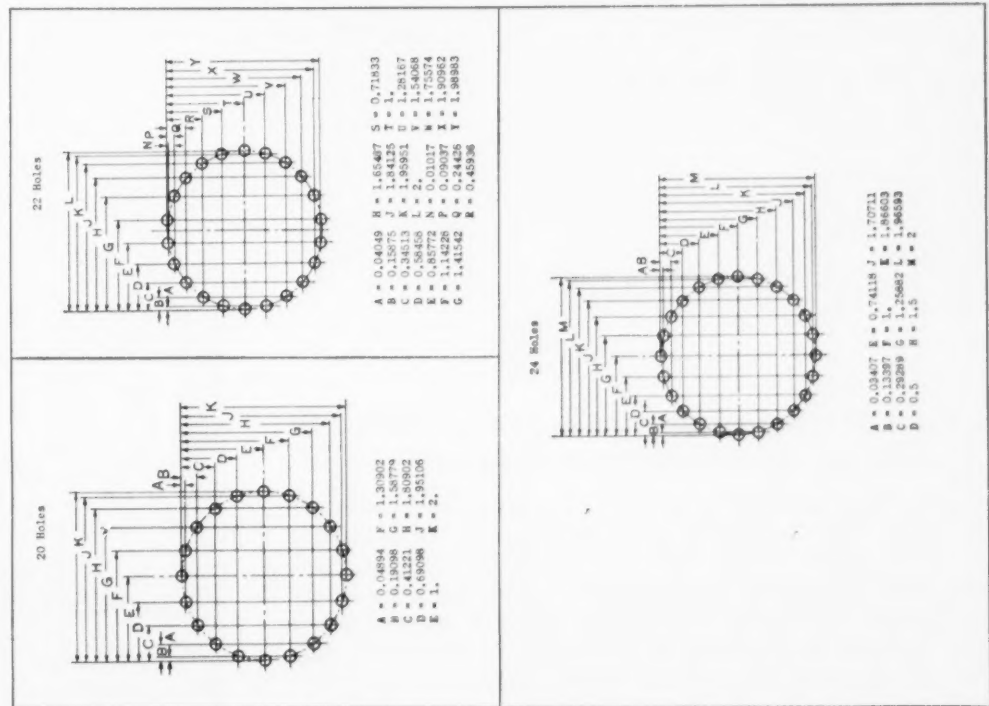
## LAY-OUT CONSTANTS FOR BOLT CIRCLES — 3 Multiply Values Shown by Radius of Pitch Circle



MACHINERY'S Data Sheet No. 755, June, 1954

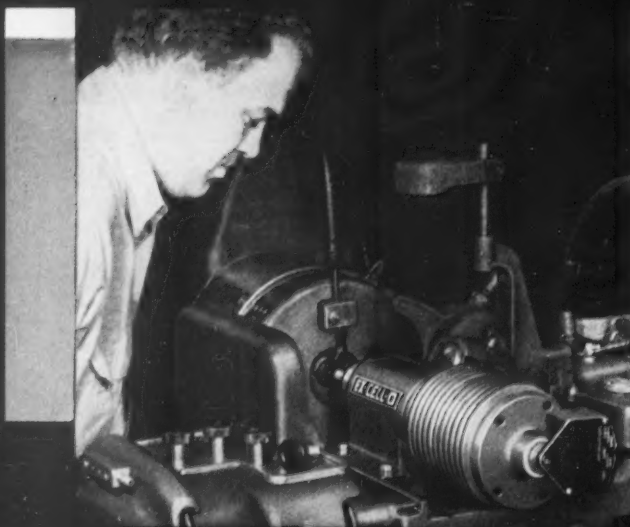
Compiled by W. G. Holmes  
Minneapolis, Minn.

## LAY-OUT CONSTANTS FOR BOLT CIRCLES — 4 Multiply Values Shown by Radius of Pitch Circle



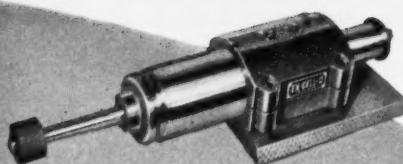
MACHINERY'S Data Sheet No. 756, June, 1954

Compiled by W. G. Holmes  
Minneapolis, Minn.

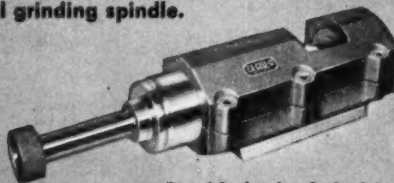


Grinding small holes with an Ex-Cell-O  
25,000 RPM High Frequency Motorized Spindle

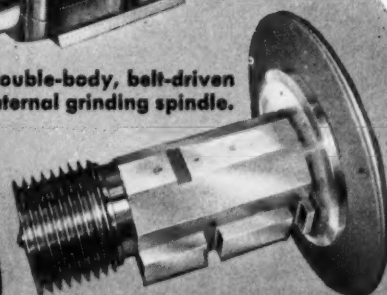
## PRECISION SPINDLES *Built for Your Work*



Single-body, belt-driven  
internal grinding spindle.



Double-body, belt-driven  
internal grinding spindle.



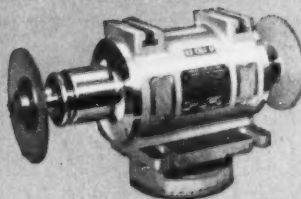
25 hp heavy duty precision spindle  
with 24" grinding wheel.



25,000 rpm high frequency  
inbuilt motor spindle.



Totally enclosed inbuilt motor  
surface grinder spindle.



Precision inbuilt motor  
spindle for cutter grinder.

Heavy duty motorized  
precision spindle  
available up to 20 hp



Get the most from your precision grinding operations by using the Ex-Cell-O Spindle that's made especially for the job.

Ex-Cell-O Precision Spindles have long been the original equipment choice of leading grinder manufacturers. They are rigid and smooth-running. For high precision work they are fitted with standard Ex-Cell-O Precision Ball Bearings; for slower speeds and heavier cuts they are equipped with heavy-duty Ex-Cell-O Precision Ball Bearings. They require no lubrication or adjustment. Phone your Ex-Cell-O representative or write to Ex-Cell-O in Detroit today for catalog 25962 listing hundreds of standard grinding spindles.



**EX-CELL-O**  
**CORPORATION**  
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE  
TOOLS • GRINDING SPINDLES • CUTTING TOOLS  
• RAILROAD PINS AND BUSHINGS • DRILL JIG  
BUSHINGS • AIRCRAFT AND MISCELLANEOUS  
PRODUCTION PARTS • DAIRY EQUIPMENT



Mass., as director of engineering. He was formerly with the Armour Research Foundation as an executive in research and development.

ARTHUR E. THORNTON, president of the Skinner Chuck Co. and the Skinner Valve Division, New Britain, Conn., was recently named chairman of the board of directors. PAUL



Paul K. Rogers, Jr., new president of the Skinner Chuck Co. and the Skinner Valve Division

K. ROGERS, JR., who was vice-president, succeeds Mr. Thornton as president. With the company for thirty-nine years, Mr. Thornton became president in 1938. Mr. Rogers, who has served on the board since 1938, was also re-elected treasurer. SHERROD E. SKINNER was elected a director of the company to fill the vacancy left by his father, the late E. J. Skinner, former chairman of the board, who died in 1953.

HARTFORD SPECIAL MACHINERY Co., Hartford, Conn., recently opened a 44,000-square foot plant in Simsbury, Conn. This is the first step in a plan to move the company's entire operation to Simsbury. For the present, the new building will be used as an assembly plant, and the fabrication of parts will continue at Hartford, the location of the main office. The company designs and produces single-purpose automatic drilling and tapping machines, the line of Super-Spacers, and automatic thread rollers, in addition to its general contract machine work.

AMERICAN EMERY WHEEL WORKS, Providence, R. I., announces the appointment of the following officers: FREDERICK J. DARBY, president and works manager; HAROLD O. SKOOG, vice-president and ceramic engineer; TORREY ALLEN, treasurer and gen-

eral manager; and WILLIAM W. TURNER, secretary and sales manager. ARTHUR L. PIERCE has retired after forty-six years of service with the company. JOHN A. DOHERTY, who was in the company's main sales office, has been appointed abrasive engineer for Rhode Island and part of Massachusetts.

FRANK A. BENOIT, JR., was recently appointed foundry and pattern shop superintendent of the Brown & Sharpe Mfg. Co., Providence, R. I., succeeding LEROY M. SHERWIN, who has retired. After serving his apprenticeship with Brown & Sharpe, Mr. Benoit was associated with other companies for a few years, then returned in 1934. Five years later, he became foreman of the pattern shop, and in 1953 was made assistant superintendent of the foundry.

TACO HEATERS, INC., has moved from Providence to 1160 Cranston St., Cranston, R. I.

### New York and New Jersey

HENRY S. WINGATE, vice-president and a director of the International Nickel Co. of Canada, Ltd., Toronto, Ontario, was recently elected president of the company. Mr. Wingate was also elected to membership on the executive committee and to the presidency of the United States subsidiary, the International Nickel Co., Inc., New York City, where he will have his headquarters. At the same time, F. M. A. NOBLET, assistant treasurer, was elected treasurer of both companies and WALTER C. KERRIGAN, assistant to the president of both companies. Mr. Kerrigan has been serving as general sales manager and a vice-president of the subsidiary. Mr. Wingate succeeds DR. PAUL D. MERICA, who is retiring, while Mr. Noblet succeeds WILLIAM J. HUTCHINSON. Both Dr. Merica and Mr. Hutchinson will continue as directors and members of the executive committee. J. ROY GORDON, vice-president and a director, was transferred from Copper Cliff, Ontario, to New York City. He is being succeeded by RALPH D. PARKER as general manager of Canadian operations. Mr. Parker is also assistant vice-president.

NIAGARA CUTTER Co., 367 Schenck St., North Tonawanda, N. Y., was recently organized by ROGER W. BOLLIER and MARSHALL H. DAMERELL, offering a cutting tool grinding service. In addition to this, the new company will be a distributor for the UNION TWIST DRILL Co., Athol, Mass.

W. HARVEY THOMPSON has been named assistant to the executive vice-president of the H. K. Porter Co., Inc., New York City. He suc-

ceeds R. F. ALLEN, who has been elected a vice-president in charge of Porter's Buffalo Steel Division.

F. A. UPPER, manager of the sales engineering branch of The Carborundum Company, Niagara Falls, N. Y., was recently appointed to the Standards Council of the American Standards Association, New York



F. A. Upper, of The Carborundum Company, who has been appointed to the A.S.A. Standards Council

City, representing the Grinding Wheel Institute. Mr. Upper is chairman of the Standardization Committee of that Institute. He has served The Carborundum Company for thirty years, and has been granted thirteen United States patents and eighteen foreign patents on abrasive products and processes.

FRED W. BEITNER has been made manager of sales for the northeastern territory of the Trent Tube Co., a subsidiary of the Crucible Steel Company of America, Pittsburgh, Pa. Mr. Beitner will have his headquarters in the Chrysler Bldg., New York City. He was formerly sales manager for the Pittsburgh-Cleveland area.

EDGAR N. MATHER has been appointed machine tool sales engineer by the Lipe-Rollway Corporation, Syracuse, N. Y., manufacturer of heavy-duty truck clutches, automatic pneumatic bar feeds, and Carbo-lathes. Mr. Mather will represent the firm in the midwestern and east-central sales areas.

ALLEN B. DOGGETT has been appointed district manager in northern New York State for the Destiny Products Co., Detroit, Mich., lubricant manufacturer. His headquarters will be at East St., Pittsford, N. Y.

ROBERT A. REESE has been assigned by the Standard Pressed Steel Co., Jenkintown, Pa., to a sales post in the New York State territory, with headquarters in Rochester. He joined the company six years ago, and was previously head of market research and sales analysis.

REINER MACHINERY CORPORATION, located at 235 Canal St., New York City, has moved to 42-01 Northern Blvd., Long Island City, N. Y., retaining the City office as a branch, however.

GEORGE V. DUTNEY has joined the Nordberg Mfg. Co., Milwaukee, Wis., in the capacity of special assistant to the president. Mr. Dutney will make his headquarters in the New York City office.

HUGO LORANT, vice-president and member of the board of Hydropress, Inc., New York City, has been elected senior vice-president. PAUL MAYER has been named assistant vice-president.

SELDEN E. DOUGHTY has been named production manager of the Alloy Tube Division, Union, N. J., of the Carpenter Steel Co., Reading, Pa. Before his appointment, Mr. Doughty was chief metallurgist at the Union mill. He will be responsible for the Division's production, engineering, scheduling, and personnel. Mr. Doughty has been with the Alloy Tube Division since 1946.

ELECTROLIFT, INC., has combined its facilities in a new plant at 204 Sargeant Ave., Clifton, N. J.

## Ohio

ROBERT E. SAGE has been made assistant to the executive vice-president, J. S. ROSCOE, of the Lincoln Electric Co., Cleveland, Ohio. Mr. Sage will act as administrative assistant for sales. He has been in the Lincoln sales organization for six years. ROBERT WILSON, head of application engineering and director of training, has been elected to the board of directors. Mr. Wilson has been a member of Lincoln's sales and engineering staff for the last seventeen years. Also announced was the addition of four application engineers to the field districts, as follows: ROBERT CLIPSHAM, Kansas City, Kans.; GORDON COLLIER, Philadelphia, Pa.; JOHN GONZALES, Columbus, Ohio; and DONALD HASTINGS, Emeryville district on the West Coast.

HARRY M. HECKATHORN, executive vice-president of the Mullins Mfg. Corporation, Salem and Warren, Ohio, has become president, succeeding GEORGE E. WHITLOCK, who has been made vice-chairman of the

board. Three new vice-presidents were also named: HAROLD O. SMITH, vice-president in charge of operations; HARRY KROHNE, vice-president, controller, and secretary; and FRANK W. KNECHT, JR., vice-president of administrative planning and assistant secretary.

JOHN L. ONGEMACH has been named manager of the Cleveland, Ohio, office of Danly Machine Specialties, Inc., Chicago, Ill., manufacturer of mechanical presses and die sets. Mr. Ongemach was formerly manager of the Dayton, Ohio, office, a position which will now be filled by B. A. HALL. NIEL GRIEST has joined the company as sales engineer in the Dayton branch. Mr. Griest was formerly with the Producto Corporation.

EDWARD J. HEFFNER, consultant in the United States Steel Supply Division of the United States Steel Corporation, and formerly Cleveland district manager, has retired. Mr. Heffner joined the Scully Steel Co. in 1934, which is now known as the United States Steel Supply Division, Cleveland, Ohio.

WILLIAM D. HAHN has been elected president of the City Auto Stamping Co. and its subsidiary, the City Machine & Tool Co., Toledo, Ohio, succeeding the late Charles C. Bigelow. Mr. Hahn, who has been with the organization for twenty years, was treasurer and a director.

AMERICAN STEEL & WIRE DIVISION OF UNITED STATES STEEL CORPORATION, Cleveland, Ohio, announces an exchange of two district sales managers—WILLIAM W. DEAL, who was at New York City, will change with FRED L. NONNENMACHER, who was at Chicago.

JOHN D. HUMPHREYS has been promoted to the post of assistant chief engineer of the Cincinnati Lathe & Tool Co., Cincinnati, Ohio. Mr. Humphreys was in the engineering department.

R. J. REIF has been appointed advertising manager of the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. Mr. Reif was formerly assistant advertising manager of the National Machinery Co., Tiffin, Ohio.

CINCINNATI MACHINERY CO., INC., dealer in new and rebuilt machine tools, recently moved to its new plant at 3900 Kellogg Ave., Cincinnati, Ohio.

JACK E. DAVIS has been appointed plant manager of the Colson Corporation, Elyria, Ohio, manufacturer of wheeled products.

## Pennsylvania

EDWARD H. WHEELER, chief engineer at the Standard Pressed Steel Co., Jenkintown, Pa., has been made manager of the Forging Division. Succeeding Mr. Wheeler as chief engineer is JOHN M. SHERMAN, who was manager of quality control. Mr. Wheeler, who has been with Standard Pressed Steel since 1935, was made chief engineer in 1951. Mr. Sherman joined the company in 1940 as a screw machine operator and two years ago became manager of quality control. This position will now be filled by WILLIAM J. PARK, who was general foreman of quality control. WILLIAM M. BRINER has been made supervisor of industrial relations, and WILLIAM M. KERRIGAN, supervisor of production control, expediting, and stock moving planning.



(Left) John M. Sherman, chief engineer at Standard Pressed Steel Co.; and (right) Edward H. Wheeler, manager of the Forging Division



Operations like this are always interesting to concerns who need dependable, cost-cutting lathes for their own products or to build equipment for others.

For example, at Bell Aircraft, Buffalo, New York, this SIDNEY LATHE is making a sleeve for a tool grinding machine which will be used for grinding parts for their rocket engines. Naturally they need and get allowable tolerances of .001 ( $\pm$ ) without any trouble.

Bell Aircraft also uses SIDNEY LATHES to machine gear cutters which are used in connection with their guided missile program.

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IN

BUFFALO, NEW YORK

WRITE  
FOR  
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(Left to Right) John E. McCauley, chairman of the board and chief executive officer of the Birdsboro Steel Foundry & Machine Co.; G. Clymer Brooke, president; Arlan L. Wentzel, vice-president and works manager; and James M. Heppenstall, vice-president and treasurer

JOHN E. MCCAULEY, president of the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., for the last twenty years, has been elected chairman of the board and chief executive officer. Mr. McCauley joined the company in 1910 as assistant general manager. He became vice-president and general manager in 1919, and president in 1934. G. CLYMER BROOKE has been promoted from executive vice-president to president. Mr. Brooke has been with Birdsboro since 1931. Six years later, he became assistant to the vice-president, and in 1945, vice-president. In 1953, he was appointed executive vice-president. Also announced was the advancement of JAMES M. HEPPENSTALL from treasurer to vice-president and treasurer, and of ARLAN L. WENTZEL, from assistant vice-president and works manager to vice-president and works manager.

ROBERT A. JOHNSON has been named New York district sales manager for the Meter and Valve Division of the Rockwell Mfg. Co., Pittsburgh, Pa. Mr. Johnson was formerly district sales manager at Atlanta, Ga. GEORGE L. GEUSS, a service engineer with Rockwell for the last fourteen years, has been appointed assistant manager of Nordstrom Products in this Division. Mr. Geuss will have his headquarters at the company's Homewood, Pa., plant. Also announced was the appointment of a distributor in the Syracuse area for Nordstrom lubricated plug valves: BURNS PIPING SUPPLY, INC., 417 S. Clinton St., Syracuse, N. Y.

J. E. MULLEN has been appointed general sales representative for the Pittsburgh Gear Co., Pittsburgh, Pa., a subsidiary of the Brad Foote Gear Works, Inc., Cicero, Ill. Mr. Mullen will continue to represent the parent company in Ohio and western Pennsylvania. His headquarters will be at 1109 G. Daniel Baldwin Bldg., Erie, Pa.

LEEDS & NORTHRUP Co., Philadelphia, Pa., has announced plans to construct an instrument plant consisting of a 250,000-square-foot building at North Wales, Pa. The new plant will be an addition to its present facilities, which are located in the Germantown section of Philadelphia.

H. BIGELOW MOORE has been appointed sales application engineer on the staff of the Philadelphia district sales office of the Reliance Electric & Engineering Co., Cleveland, Ohio.

RUSSELL HOEHL, assistant manager of the Philadelphia district for the Russell, Burdall & Ward Bolt and Nut Co., Port Chester, N. Y., has been promoted to district manager of the Philadelphia office, which is located at Ardmore.

DON WATKINS has joined the Continental Foundry & Machine Co., East Chicago, Ind., as a vice-president. Mr. Watkins will have his headquarters at the company's Pittsburgh, Pa., office.

DWIGHT W. KAUFMANN has been appointed to the newly created post of eastern sales manager by Rem-Cru Titanium, Inc., Pittsburgh, Pa. His office will be in Midland, Pa.

PAUL S. LANDIS has joined the Jones & Laughlin Steel Corporation, Pittsburgh, Pa., in the capacity of assistant manager, sheet and strip products.

PITTSBURGH STANDARD CONDUIT Co., Pittsburgh, Pa., recently opened its Morrisville, Pa., plant, designed for the manufacture of rigid steel conduit.

ALLOY METAL WIRE Co. DIVISION of H. K. PORTER Co., INC., has completed a new addition to its plant in Prospect Park, Pa.

### Wisconsin, Minnesota, and Missouri

ALLEGHENY LUDLUM STEEL CORPORATION, Pittsburgh, Pa., recently opened a tool steel warehouse and district office in a new building at 3800 N. First St., Milwaukee, Wis. This office will handle direct mill sales of Allegheny Ludlum products as well as warehouse business. It will also sell the company's cemented carbide from its Carmet Division, and tool steel forgings and high-alloy tool steel castings from its Forging and Casting Division.

R. E. PRICE has been named general manager of the Gardner Machine Co., Beloit, Wis. He joined the Gardner organization in 1952, previously having been with the Landis Tool Co., Waynesboro, Pa., for twenty-three years. Also announced were the following appointments:



R. E. Price, general manager of the Gardner Machine Co.



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## DESIGNED AND BUILT FOR SUPERIOR PERFORMANCE LONGER LIFE

No tie rods. Finer appearance, greater strength. This permits unusual length when required.

Alloy iron Universal end caps. Rugged. Port completely rotatable—air vents four sides.

Alloy iron Universal collars. Removable, replaceable. Permit exact positioning of foot-type mountings.

Satin-smooth bore. "TRU-BORED" perfectly straight, perfectly round.

Cast iron piston. Grooves precision cut for superior seal. Piston concentric with and locked to piston rod.

Confined gaskets—seal positively, cannot extrude.

Ground steel piston rod. Concentric with and locked to piston.

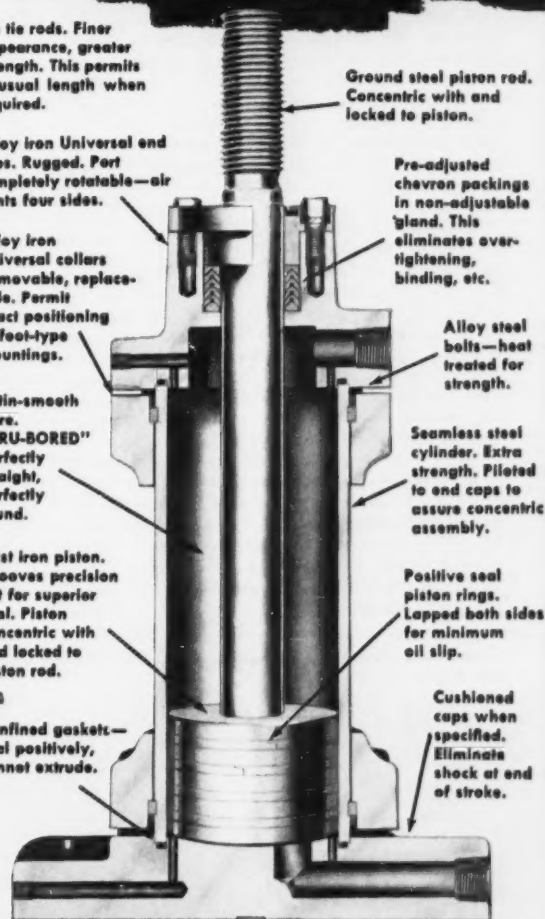
Pre-adjusted chevron packings in non-adjustable gland. This eliminates over-tightening, binding, etc.

Alloy steel bolts—heat treated for strength.

Seamless steel cylinder. Extra strength. Piloted to end caps to assure concentric assembly.

Positive seal piston rings. Lapped both sides for minimum oil slip.

Cushioned caps when specified. Eliminates shock at end of stroke.



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RUSSELL L. DUSTMAN, Jr., manager of the machinery sales office in Richmond, Ind., to supervise sales and service engineering for Gardner disc grinders in southern Indiana, western Ohio, and Kentucky; and JOHN E. SCHOBINGER, manager of the Detroit, Mich., sales office for the Machinery Division. Mr. Schobinger was formerly manager of the Hartford, Conn., sales office for the Landis Tool Co.

EMIL GAIRING has joined the Waukesha Tool Co., Waukesha, Wis., as executive vice-president and a director. He will be responsible for sales, engineering, and production. Mr. Gairing was the founder and former president of the Gairing Tool Co., Detroit, Mich.

CRUCIBLE STEEL COMPANY OF AMERICA, Pittsburgh, Pa., announces that its Milwaukee, Wis., branch sales office and warehouse has moved to 4200 W. Douglas Ave., a new building.

DONALD H. SCHULTZ has been named Wisconsin sales representative in charge of the Milwaukee, Wis., office by the Circo Equipment Co., Clark (Rahway), N. J.

ALLEGHENY LUDLUM STEEL CORPORATION, Pittsburgh, Pa., has appointed the JUNGHER STEEL & SUPPLY Co., St. Paul, Minn., to sell the complete line of Ludlum tool steel, bars, forgings, and castings. The Junger concern was recently formed at 765 Hampden Ave., with E. F. JUNGHER and FRED F. JUNGHER as partners. Its warehouse is located at 1179 Fifteenth Ave., S.E., Minneapolis.

DE LAVAL STEAM TURBINE CO., Trenton, N. J., has opened a sales office at 25 S. Bemiston Ave., St. Louis, Mo. This office will be operated as a branch of the Chicago district office, with WILLIAM F. YOUNG as sales engineer in charge.

## Holland

WATSON-STILLMAN Co., DIVISION OF H. K. PORTER Co., Inc., Roselle, N. J., has established European sales, service, and manufacturing facilities in Holland through a subsidiary—WATSON-STILLMAN INTERNATIONALE MAATSCHAPPIJ, N. V., Groothandelsgebouwen Bldg., Rotterdam. Manufacturing facilities have been arranged with N. V. MACHINE-FABRIEK "BREDa," formerly Backer en Rueb, of Breda, Netherlands. This company will manufacture a complete line of Watson-Stillman hydraulic machinery. Officers of the newly organized corporation are: T. M. EVANS, president; C. R. DOBSON, executive vice-president; A. B. DISS, vice-president; J. C. LESLIE, treasurer; and R. A. YORK, manager. Messrs. Evans, Dobson, and Leslie hold the same posts with H. K. Porter Co., Inc.

## Coming Events

MAY 31-JUNE 11—SEVENTH CANADIAN INTERNATIONAL TRADE FAIR to be held at Exhibition Park, Toronto, Ontario, Canada. For further information, write to C. C. Hoffman, Trade Fair Administrator.

JUNE 6-9—Annual meeting of the AMERICAN GEAR MANUFACTURERS ASSOCIATION to be held at the Homestead, Hot Springs, Va. Executive secretary, John C. Sears, One Thomas Circle, Washington 5, D. C.

JUNE 7-10—Sixth National Plastics Exposition sponsored by the SOCIETY OF THE PLASTICS INDUSTRY, Inc., at the Public Auditorium in Cleveland, Ohio. Chairman, P. H. Grunnagle, Society of the Plastics Industry, Inc., 67 W. 44th St., New York 18, N. Y.

JUNE 9-11—Eighth Annual Convention of the AMERICAN SOCIETY FOR QUALITY CONTROL to be held at the Jefferson Hotel, St. Louis, Mo., with technical sessions at the Kiel Auditorium. Further information can be obtained from U. C. Gramsch, Registrar, Box 4436, Wade Station, St. Louis 15.

JUNE 13-18—Fifty-seventh annual meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS and eleventh exhibit of testing and scientific apparatus and laboratory supplies to be held at the Hotel Sherman, Chicago, Ill. Address of Society: 1916 Race St., Philadelphia 3, Pa.

JULY 13-15—WESTERN PLANT MAINTENANCE SHOW to be held at the Pan Pacific Auditorium, Los Angeles, Calif. For further information, write to Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

SEPTEMBER 21-23—Annual meeting and exhibition of the SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS in conjunction with the First International Instrument Congress and Exposition, to be held at the Bellevue-Stratford Hotel, Philadelphia, Pa. For further information, write to the general chairman, Frank G. Tatnall, Box 4034, Chestnut Hill, Philadelphia 18, Pa.

## Film Shows Industrial Uses of Atmospheric Gases

A 16-millimeter color motion picture with sound, entitled "Whatever We Do" has been produced by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. This is a documentary film about such atmospheric gases as oxygen, nitrogen, argon, and helium. Dramatic photography shows the role of these gases in many applications.



Newly elected officers of American Society of Tool Engineers. (Seated, left to right) Harold E. Collins, third vice-president; H. C. McMillen, second vice-president; Dr. H. B. Osborn, Jr., first vice-president; J. P. Crosby, president; Wayne Ewing, secretary; R. C. W. Peterson, treasurer; H. D. Long, assistant secretary-treasurer. (Standing) Harry E. Conrad, executive secretary

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Chris-Craft cruisers are protected at the stem by brass stem bands; Revere supplies half-round extruded shapes for this decorative and protective application. At the stern or transom, copper exhaust tubes are just visible. There is a story behind these tubes, which have to be bent to shape with great accuracy, and without wrinkling. Chris-Craft Corporation's specifications are most exacting. The bending is done by a specialist, the Melville-Lee Co., located in Algonac, Mich., as is Chris-Craft. When Revere sought an order for the copper tube, the Technical Advisory Service was permitted to study Melville-Lee's equipment and methods, so our Methods Department at the mill could be thoroughly informed of the high quality requirements.

The tube required runs in sizes from 2" to 3½" OD. Use of copper tube reduces weight, while the corrosion-resisting qualities of copper make it durable and long lasting. Special standards of control over roundness, eccentricity and temper were set up in our mill, and production shipments have worked perfectly from the very beginning. No wrinkling or tearing has been encountered.

Revere Metals not only serve afloat, but in the air, under the sea, and on land, in almost every industry, including such diverse ones as the chemical, automotive, electrical and electronic, and in the home. Products include tube and pipe, rod and bar, sheet and plate, strip, extruded shapes, forgings, in copper and its alloys and aluminum alloys. Also Lockseam Tube electric welded steel tube. Get in touch with the nearest Sales Office.

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## Obituaries

### Lloyd D. McDonald

LLOYD D. McDONALD, executive vice-president of the Warner & Swasey Co., Cleveland, Ohio, died on May 15 of a heart attack at his home in Shaker Heights, at the age of sixty years. Mr. McDonald was born in Dunkirk, N. Y., and came to



Greystone Studios, Inc.

Lloyd D. McDonald

Cleveland when he was sixteen years old. He joined the credit department of Warner & Swasey in 1918, and advanced successively to the positions of credit manager, assistant treasurer, and vice-president. In 1950, Mr. McDonald became executive vice-president. He had been a director of the company since 1936, and was also a director of the Osborn Mfg. Co. and the Rotor Tool Co., both of Cleveland. Mr. McDonald was a member and a past president of the National Machine Tool Builders' Association.

M. W. HODGDON, manager of forging sales of the Aluminum Company of America, Pittsburgh, Pa., died recently at his home in Cleveland, Ohio. Mr. Hodgdon was in charge of sales of aluminum and magnesium forgings produced at the company's two forging plants. He joined Alcoa in 1927 in the Chicago sales office. In 1942, he was transferred to the purchasing department in Pittsburgh. That same year he became works manager of the aircraft cylinder head foundry operated by Alcoa for the Government at Kansas City. When the plant closed in 1945, he was named to the post of assistant manager of forging sales in Cleveland, advancing to manager last year. Mr. Hodgdon is survived by his wife and a daughter.



Philip O. Geier

### Philip O. Geier

PHILIP O. GEIER, treasurer and chairman of the board of the Cincinnati Milling Machine Co., Cincinnati, Ohio, until his retirement three years ago, died on April 20 in Tucson, Ariz., at the age of seventy-seven years. Mr. Geier was associ-

ated with the company for forty-seven years. He became treasurer in 1911 and chairman of the board in 1934, holding both offices until his retirement in 1946. Mr. Geier continued as a director of the company until 1952. He is survived by his wife and two sons—Philip O. Geier, Jr., who is assistant manager of the Products Division of the Cincinnati Milling Machine Co.; and Walter E. Geier, who is associated with the Carbon Webb Corporation.

G. T. VAN ALSTYNE, director of advertising and publicity for the Air Reduction Co., Inc., New York City, died on April 21 at his home in Plainfield, N. J., at the age of sixty-two years. Mr. Van Alstyne joined Airco's advertising department in 1919. He was appointed advertising manager for the Air Reduction Sales Co. in 1931, a post he held until 1952, when he became director of advertising and publicity for the parent company.

HARRY L. BILL, vice-president and general manager of the Greenfield Tap & Die Corporation, Greenfield, Mass., died on April 15.

SAMUEL BOTWINIK, president of Botwinik Brothers, Inc., New Haven, Conn., died on April 17.

## New Books and Publications

**METALS PROPERTIES (ASME HANDBOOK).** Edited by Samuel L. Hoyt. 433 pages, 7 1/2 by 10 inches. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price, \$11.

Compiled in this reference book is specific information for the designer about the properties of the metals with which he works—properties such as strength, hardness, machinability, and electrical conductivity. The material appears in chart and table form on more than 500 metals in common industrial use—AISI steels, ASTM steels, cast copper alloys, aluminum alloys, tin, magnesium, and others. Tabulated under each of the metals listed are data on the chemical composition of the metal; its brittleness, heat-treatment, and other characteristics; its industrial uses; treatment temperatures for forging, annealing, and quenching; and other pertinent information. This volume is one of four—two are in preparation and one was published on the design function in metals engineering.

**LEXIQUE ANGLAIS-FRANCAIS ET FRANCAIS-ANGLAIS DES TERMES D'USAGE COURANT EN MACHINES-OUTILS.** 160 pages, 9 by 13 1/4 inches. Available from

La Machine Moderne, 15 Rue Bleue, Paris (IX<sup>e</sup>), France. Price, \$10.

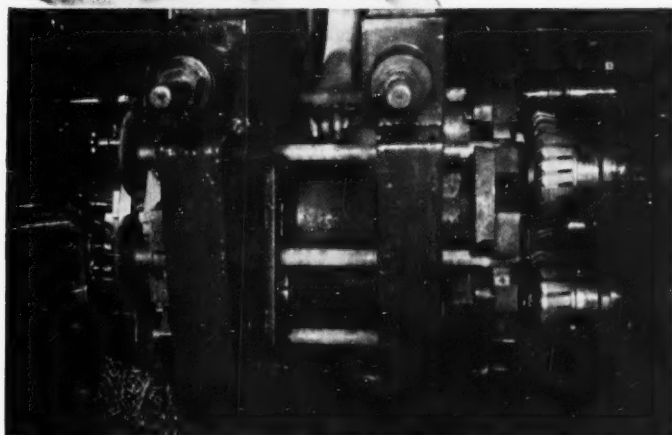
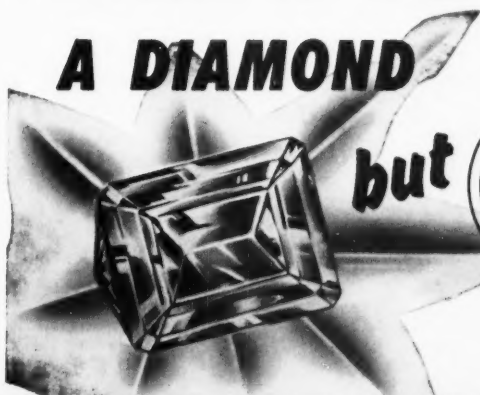
This lexicon lists English and corresponding French technical terms for machine tools and their components. The aim is to assist English and French readers of technical documents, such as catalogues and articles, in either language. The lists are compiled for each machine tool—the lathe (el tour), the drilling machine (la machine a percer), and so on—with diagrams illustrating each machine and giving reference numbers of the various components, which are duplicated in both the English and French columns.

**U. S. GOVERNMENT PURCHASING DIRECTORY.** 92 pages. Published by the Small Business Administration. Available from the Superintendent of Documents, Washington 25, D. C. Price, 50¢.

This is a guide to military and civilian purchasing activities of the Federal Government. The Administrator of the Small Business Administration states that the Directory should help small firms by informing them who, in the Government, buys what, and where. Some 4000 classes of commodities are covered.



# THERE IS NOTHING HARDER THAN A DIAMOND but **W**ESSONMETAL IS TOUGHER!



## ACTUAL JOB Large Automobile Plant

Machine . . . Davis Thompson Milling Machine  
Part . . . . . Rear axle shaft  
Operation . . . Rough and finish mill spline end  
Material . . . S.A.E. 1038—Brinell Hardness  
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Tools . . . . . Wesson 6" and 8" dia. Milling  
Cutters—fine pitch—inserted blade  
Speed . . . . . 8"—387 S.F.M.  
6"—290 S.F.M.  
Feed . . . . . 14" per minute  
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## SAVINGS OF OVER \$14,225 PER YEAR ON ONE MACHINE WITH ONE SET OF WESSON TOOLS

### OLD METHOD

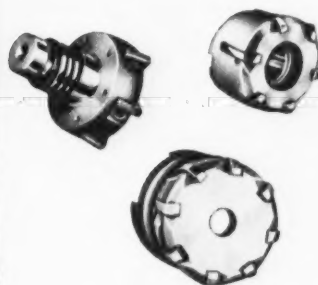
Cost 1 set Inserted Blades . . . \$48.00  
Pieces per Grind . . . . . 275  
Grinding Hours per year . . . 10,300  
5 Machines Running 3 Shifts  
Machine Repair per year . . . \$25,000  
Tool Cost per Piece . . . . . \$0.0545\*

### NEW WESSON ENGINEERED METHOD

Cost 1 set Inserted Blades . . . \$54.60  
Pieces per Grind . . . . . 1600  
Grinding Hours per year . . . 2500  
3 Machines Running 2 Shifts  
Machine Repair per year . . . \$1200  
Tool Cost per Piece . . . . . \$0.0213\*

\*(Machine repair and grinding costs not included)

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educational, full color,  
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**WESSONMETAL**  
Cemented Carbide

# WESSON METAL CORPORATION

LEXINGTON, KENTUCKY

Affiliated with WESSON COMPANY, Detroit, Mich.

## This is a Quality Drill Head

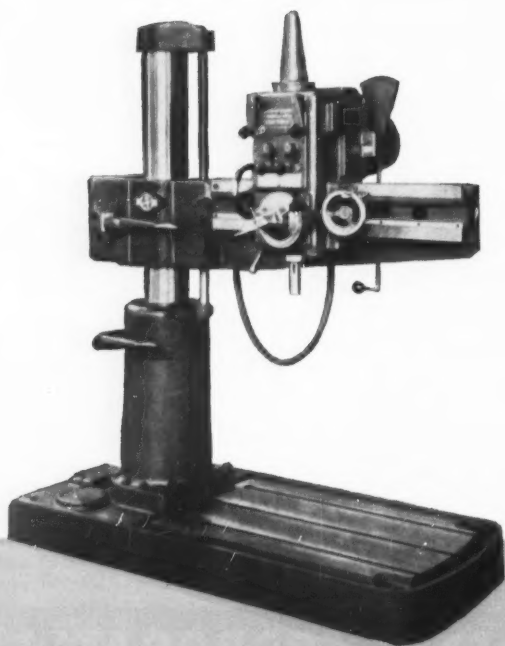
It provides 9 spindle speeds in geometric progression from 80 to 2420 rpm. It has six rates of power feed—.0025" to .020". All controls are conveniently located. The alloy steel spindle is counterbalanced by an adjustable spring. The entire mechanism is force-spray lubricated.

## It is Standard on Cincinnati 3'7" Radials costing only \$3565\*

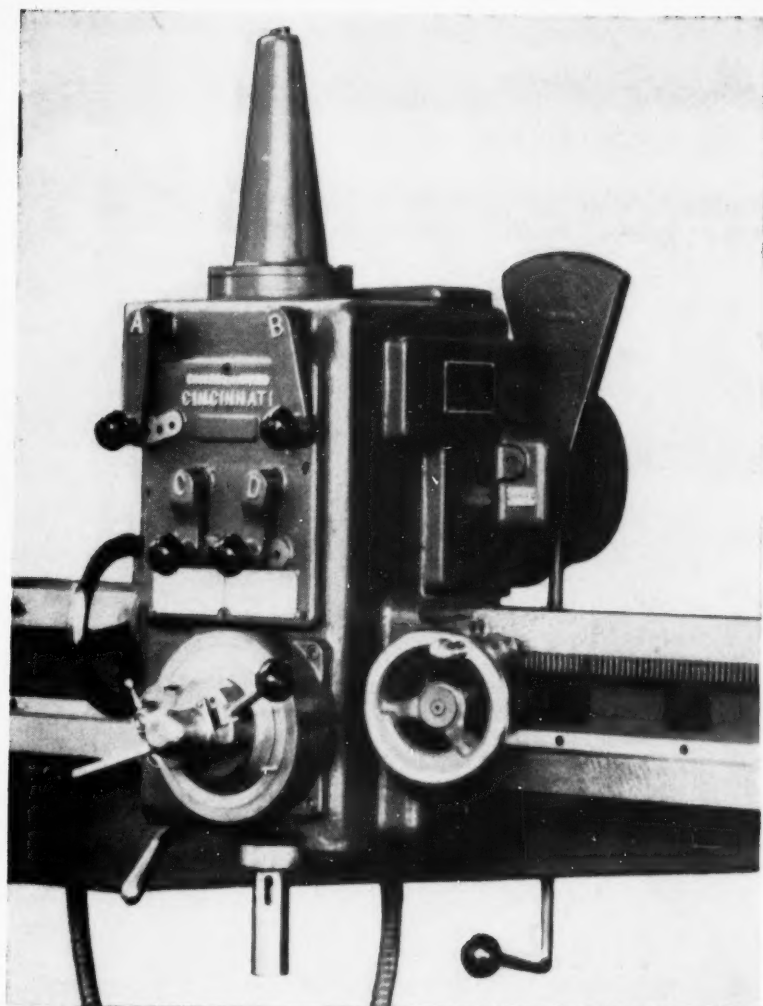
For any shop with drilling jobs of 1" and under, the Cincinnati Radial offers important moneysaving advantages. Low in first cost—low in maintenance—Cincinnati Radials can do the bulk of your drilling jobs. They free expensive equipment for the heavy, special jobs.

For name of local dealer, complete catalog information and prices, write on company letterhead to: Cincinnati Lathe & Tool Co., 3268 Disney, Cincinnati 9, Ohio.

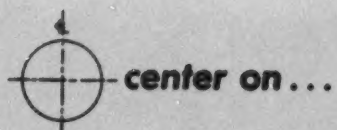
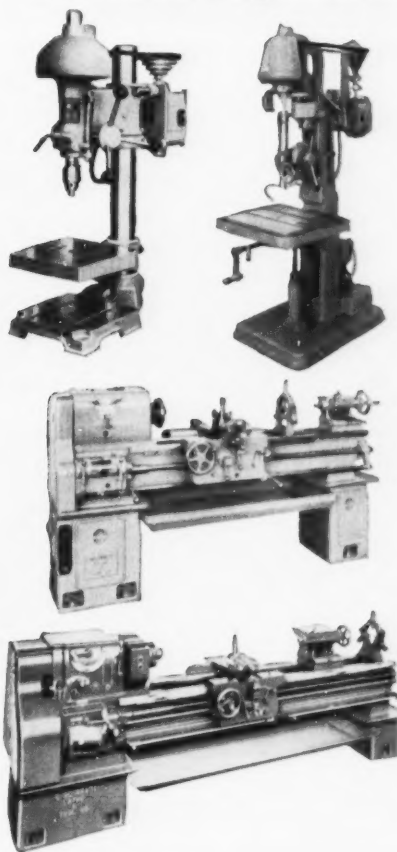
\*FOB factory. Prices subject to change without notice. Price includes 220, 440 or 550-volt, 50 or 60-cycle, 2 or 3-phase, 1800-rpm, 1-hp, a-c main drive motor; 1/2-hp, a-c arm motor and controls. No. 3 MT spindle.



1. Unit construction throughout.
2. Simple, direct drive.
3. All-gear head.
4. Self-contained feed transmission.
5. All speed and feed transmission gears of hardened alloy steel.
6. All shafts mounted on antifriction bearings.
7. Ground tubular steel column mounted on antifriction bearings.
8. Multiple-disc clutches for spindle drive.
9. Hardened and ground head rail.



There is also a complete line  
of Cincinnati Lathes—Floor  
and Bench Drilling Machines



center on...

**cincinnati** lathes and drills



For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—269

Life of These Punches Went Up

350%

with

**Ludlum DBL-3**  
**High Speed Steel**

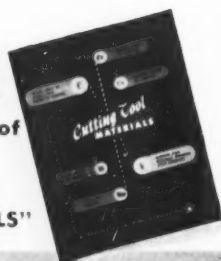
Application of  
Special Heat Treatment  
Did the Trick:

These DBL-3 punches ( $2\frac{7}{8}$ " dia. by  $10\frac{1}{2}$ " long) are used to draw and flatten hot or cold rolled stock .140" thick. With conventional heat treatment, their performance was 25% better than Material B and 50% better than Material C. But A-L Metallurgical Service recommended the *additional* heat treatment listed below, improving the performance of DBL-3 to 150% over B and 350% over Grade C!

- |                         |                                                           |
|-------------------------|-----------------------------------------------------------|
| 1. Carburize at 1950°F  | 5. Finish grind                                           |
| 2. Oil Quench           | 6. Draw at 750°F to relieve grinding stress               |
| 3. Draw at 1025°F       | 7. Nitride 72 hours at 950°F (case depth of approx. .015) |
| 4. Draw at 1025°F again |                                                           |

Ludlum DBL-3 holds a fine grain over a wide hardening range. With its higher carbon and vanadium content, it also has better abrasion resistance than other standard high speed tool steels. Our Metallurgical Service is ready to help improve *your* production operations, too. Just call our nearest branch office, or write *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.*

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your copy of  
"CUTTING  
TOOL  
MATERIALS"



This 36-page booklet analyzes and compares all A-L grades: carbon, high speed, cast alloy and carbides. Includes data on handling and treatment ... invaluable for production men.

ADDRESS DEPT. M-54

For complete **MODERN** Tooling, call  
**Allegheny Ludlum**



W&J B100

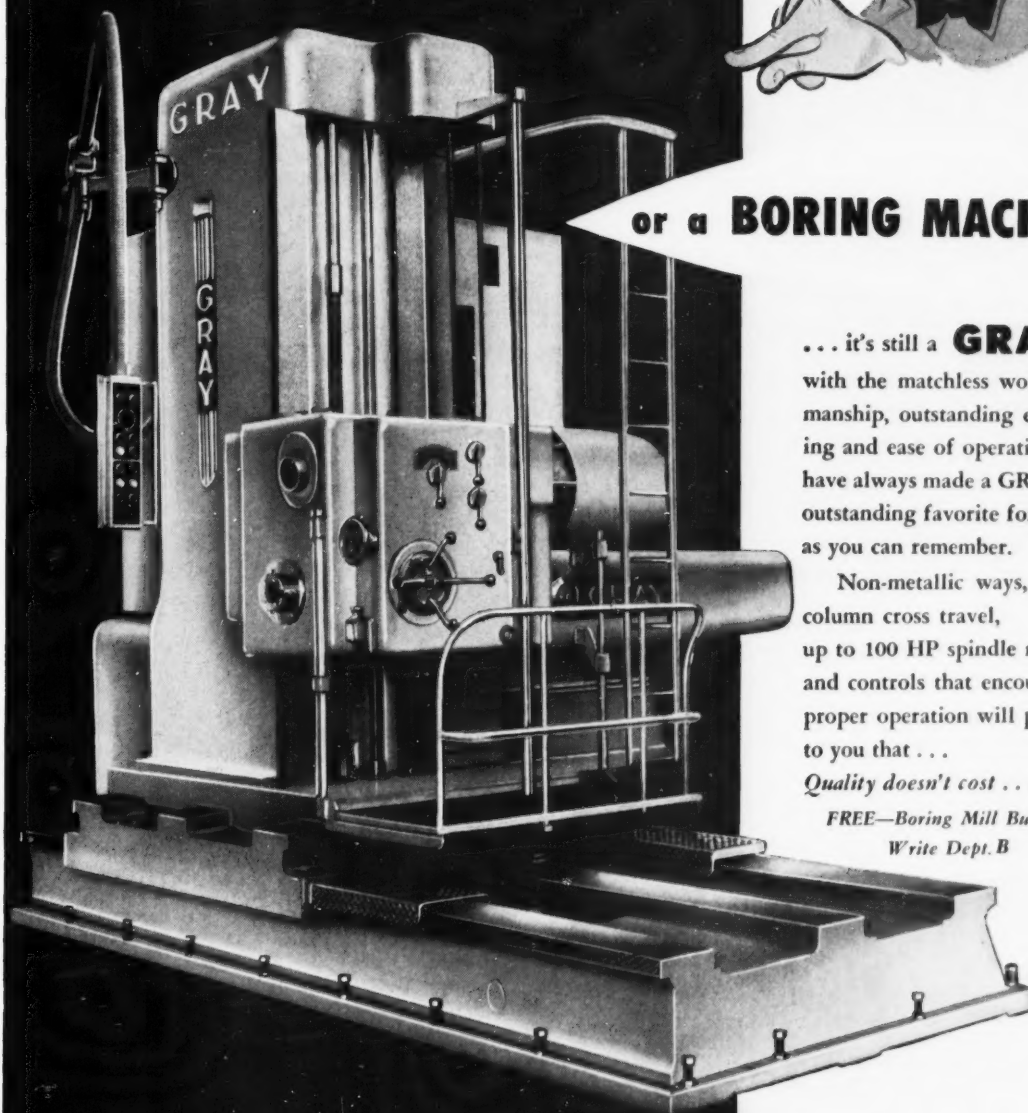


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*FREE—Boring Mill Bulletin.*

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*The G.A.* **GRAY** *Company*

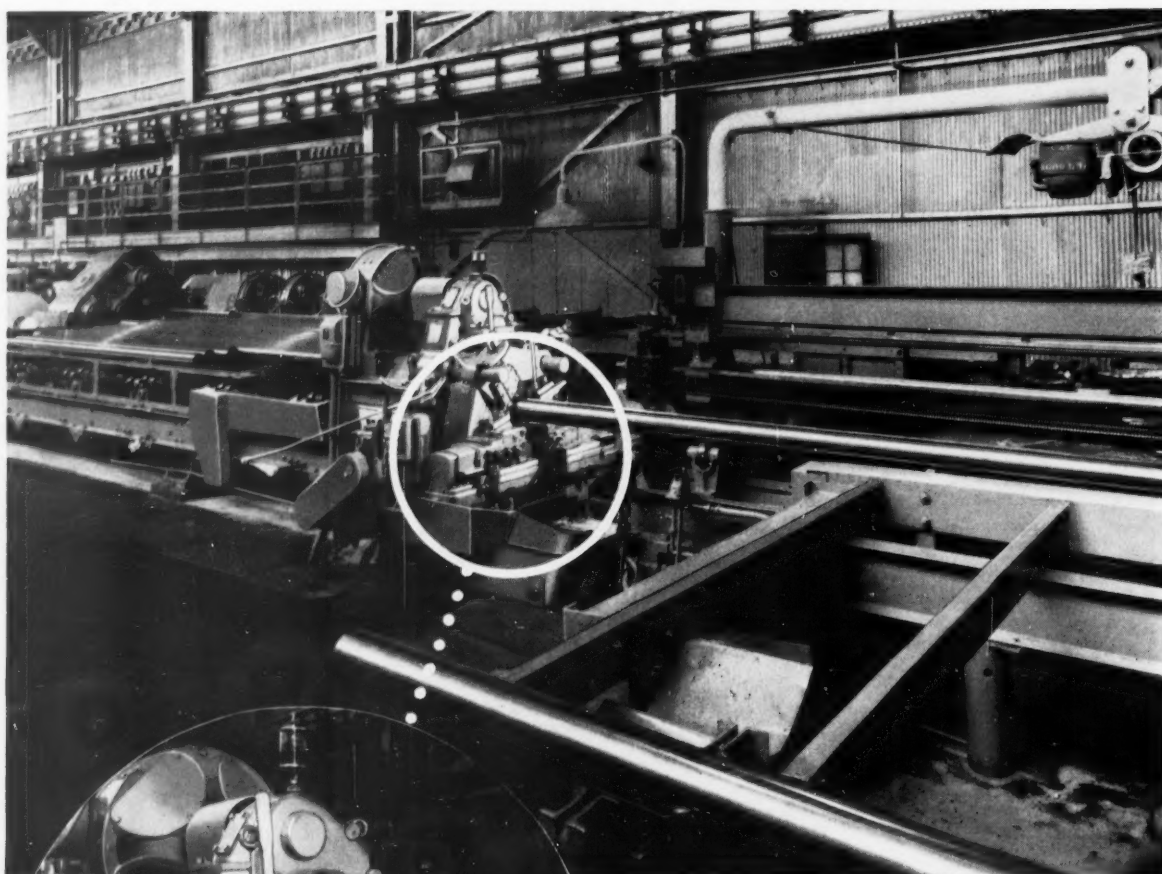
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planer type milling machines  
horizontal boring machines

# New **BARDONS & OLIVER** Cutting-Off Lathe Installed at *Jones & Laughlin*

STEEL CORPORATION — *Pittsburgh*



Photographs courtesy of Jones & Laughlin Steel Corp.

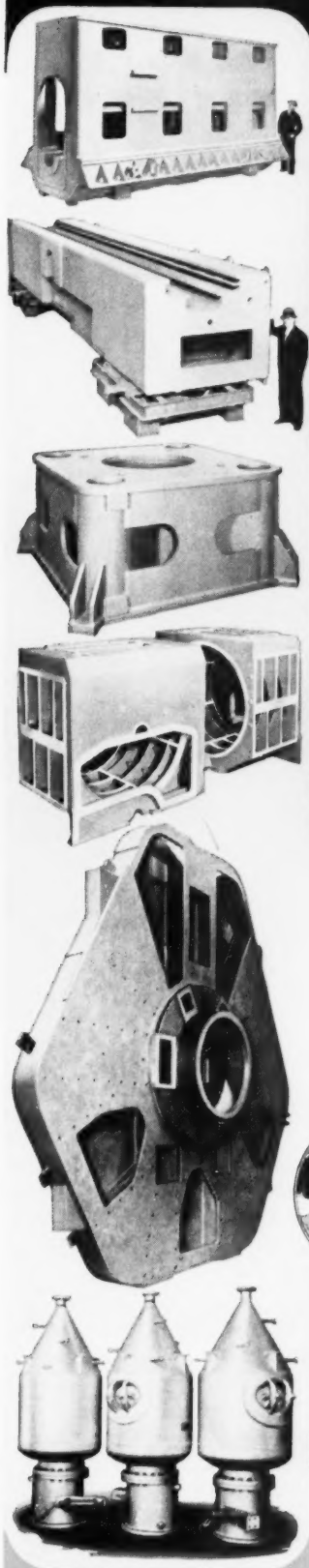
The Bardons & Oliver Cutting-Off Lathe recently installed at Jones & Laughlin, Pittsburgh Works Division, has automatic **LOADING** and **UNLOADING** tables to completely eliminate manual handling of stock. Material being cut is 6" **SOLID BAR STOCK**, ground and polished. Close up view shows the Bardons & Oliver rugged, dependable double tool slides, which reduce the time of cutting-off by close to 50%.

Bardons & Oliver Rotating Type Cutting-Off Lathes are standard equipment in most of the Nation's leading pipe and tube mills. They are available in capacities from 2" dia. to 16" dia. Write today for literature on your particular cutting-off requirements.

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The two Steel-Weld Fabricated propeller and engine mount sections for wind tunnels, illustrated above, and the parts and assemblies shown at the left, are typical of thousands of Steel-Weld Fabricated units produced and machined by Mahon for hundreds of manufacturers of processing machinery, machine tools, and other types of heavy mechanical equipment. Perhaps you, too, should discuss this service with a Mahon engineer? If you require parts or assemblies including large, heavy pieces, where time and pattern costs are a consideration, Steel-Weld Fabrication may be the answer. You can turn to Mahon with confidence . . . personnel and facilities are available within the Mahon plant to do the complete job from drawing board to finished machining. You will find in the Mahon organization a unique source with complete ultramodern fabricating, machining and handling facilities to cope with any type of work regardless of size or weight . . . a source where skillful designing and advanced fabricating technique are supplemented by craftsmanship which assures a smoother, finer appearing job embodying every advantage of Steel-Weld Fabrication. See Mahon's Insert in Sweet's Product Design File, or have a Mahon engineer call and give you complete information.

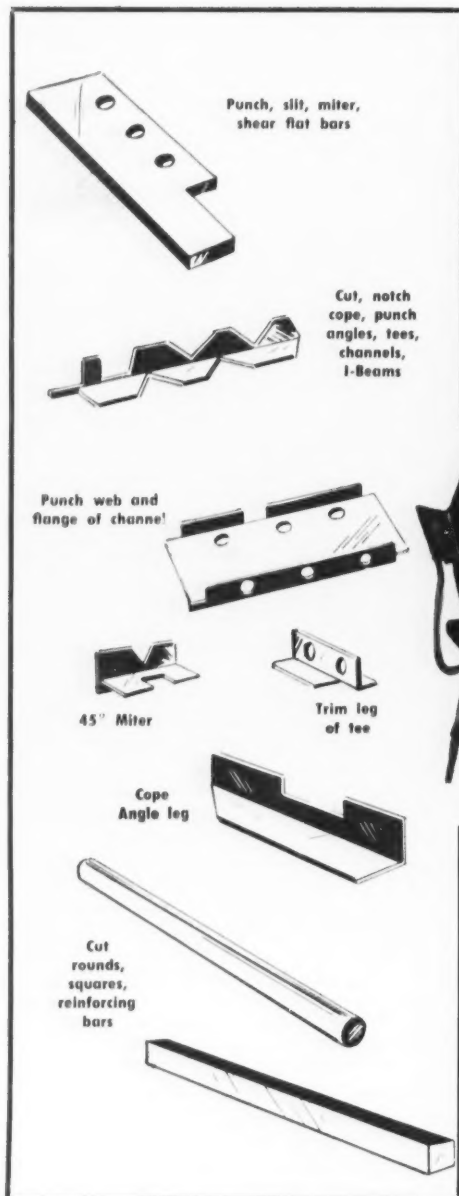
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Unretouched photo

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### The Sajo "Plain" Milling Machine



exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U. S. inch system.

★ **Standard Equipment includes:**

3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb-milling, 1" arbor, arbor support brace.

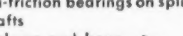
★ **Extra Equipment:**

Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

## CONDENSED SPECIFICATIONS

Table Size.....	41½" x 9½"	Precision anti-friction bearings on spindle and gear shafts
Longitudinal travel: Plain Miller.....	24½"	One-piece column and base
Universal Miller.....	27½"	Net weight—2200 lbs.
Transverse travel.....	8¼"	
Vertical travel.....	19"	
12 spindle speeds.....	36-1540 RPM	
Table feeds.....	12	
Taper in spindle.....	No. 40 NMT	
Main motor.....	3 HP	

*Write for Catalog*



Write for Catalog

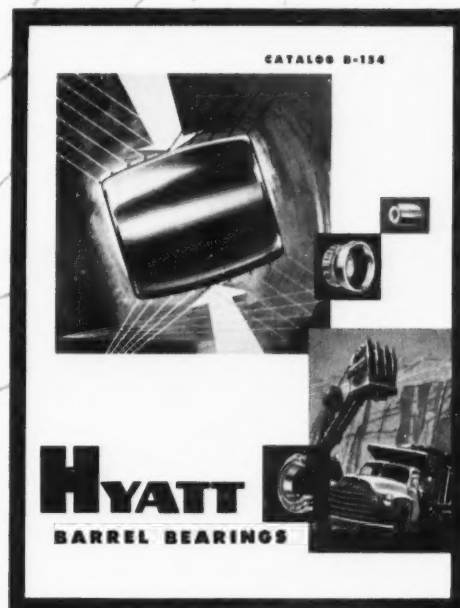


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Self-Aligning  
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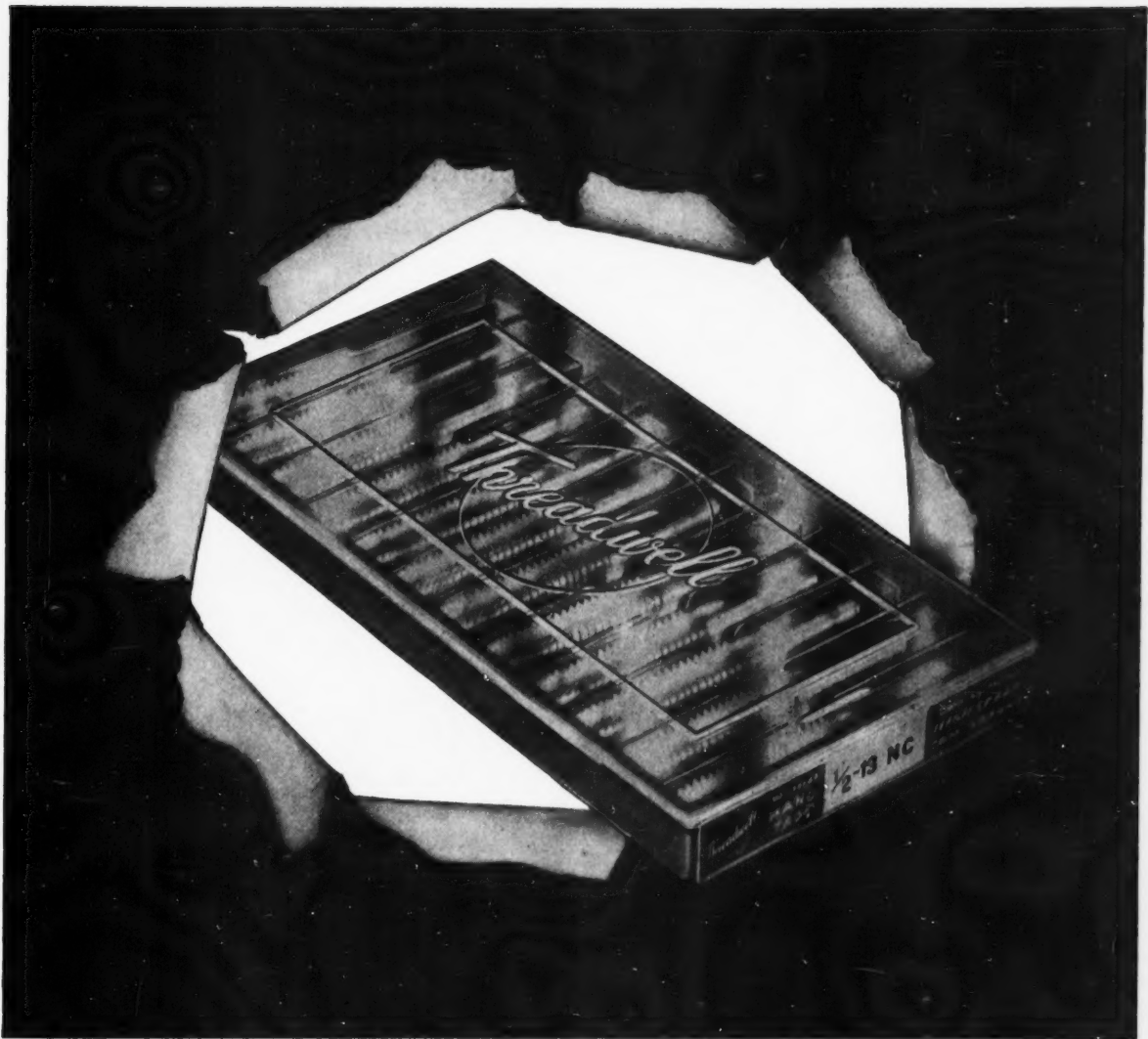


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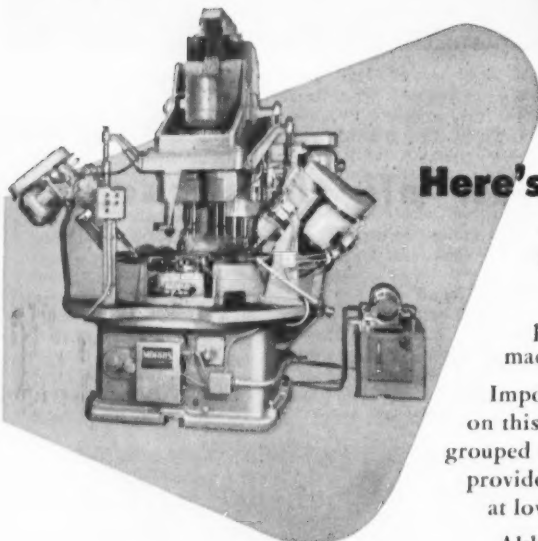
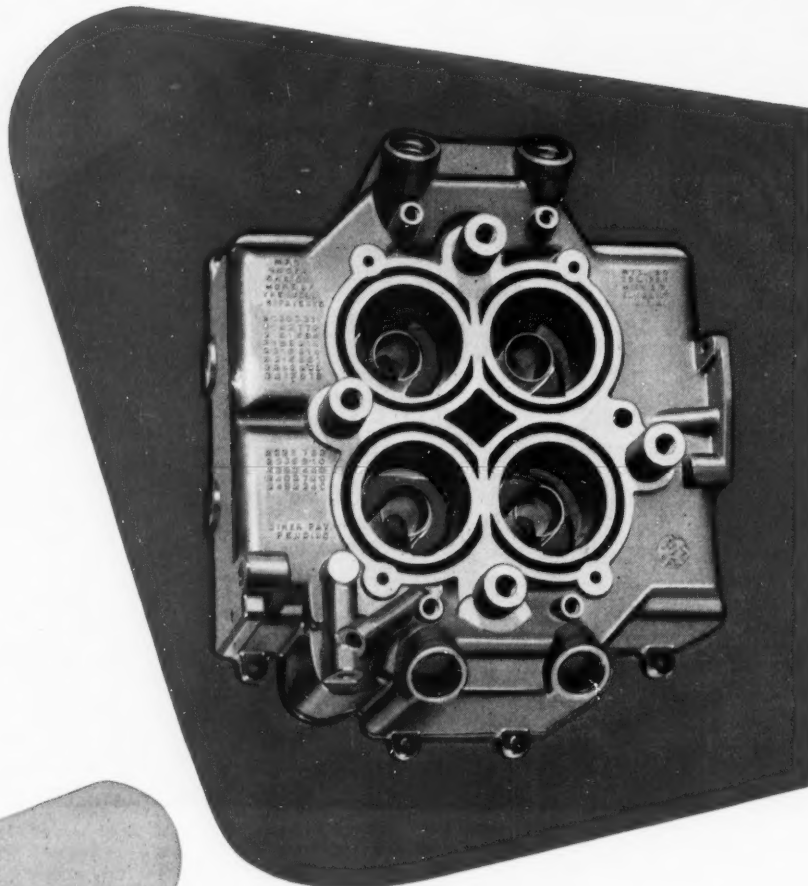
**THREADWELL TAP & DIE COMPANY • GREENFIELD, MASS.**

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—279

**How would you do all these operations?**  
 ... fast, with utmost precision, at lowest cost

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TAP	2	HOLES
DRILL	2	HOLES
REAM	2	HOLES
TAP	2	HOLES
FACE	4	SURFACES
CLEANOUT	4	DIAMETERS
FACE	4	SURFACES
TAP	2	HOLES
REAM	2	HOLES
DRILL	2	HOLES
TAP	2	HOLES
DRILL	2	HOLES



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... combining 32 operations,  
 delivering up to 375 parts per hour!

Imagine the machines, and floor space required to do this part on a separate machine basis! Instead, there's just one machine, producing approximately six parts per minute!

Important too, there's no sky-high "special machine" price tag on this or any Morris MOR-SPEED. Standard machining units are grouped on a standard base, around a standard indexing table and provided with the necessary tooling. The result is high production at lowest cost.

Although your multiple drilling, tapping, reaming and similar operations may not be as complicated as this Morris installation, chances are Morris Engineers can show you proof of substantial savings. Investigate today.



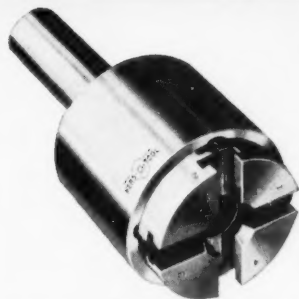
*Morris*

THE MORRIS MACHINE TOOL COMPANY, 946 HARRIET ST., CINCINNATI 9, OHIO

another example—  
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*78% faster*



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END FORM



HOLLOW  
MILL



COMBINATION  
THREAD and MILL



KNURL



BURNISH

**WITH BLADE CUTTERS**



THREAD



HOLLOW MILL

WITH

**VERS-O-TOOL**

When Whitin Machine Works, Whitinsville, Mass., applied their 1 $\frac{5}{8}$ " standard Vers-o-tool to one-pass knurling this textile machine part (7" long, B-1113 steel), they stepped up former production from 72 to 128 pieces per hour.

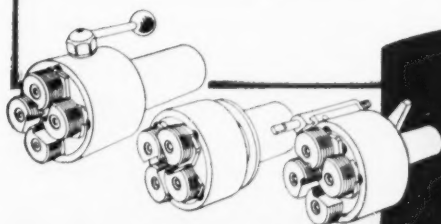
They get a higher quality too, because the 4-cutter Vers-o-tool head opens instantly at the end of the cut and pulls back fast without contact to damage the sharp knurl. Thousands of different jobs are run every day with standard Vers-o-tools equipped with multiple chasers or cutters such as those shown at the left.

Most of these simple, rugged heads are used for threading, equipped with the long lived Ground Thread Circular Chasers—most economical for long runs—or with the lower-cost Adjustable Blade Ground Thread Chasers for smaller lots. All guarantee Class 3 or pressure-tight quality threads—and smoother.

Conversion from Circular Chaser threading to any other type multiple cutters is simple: you change only the cutters and blocks—all types of which are interchangeable, head size for head size, for revolving or non-revolving heads. Vers-o-tool capacities range from .056" to 6 $\frac{1}{2}$ ".

Ask us to show you how standard VERS-O-TOOLS can step up your OUTPUT, guarantee ACCURACY, reduce your TOOL INVESTMENT and your OPERATING COST. Ask for catalog DT-52.

24-hour deliveries on standard stockable NC and NF chasers and blocks. Also National Taper Pipe and Dry Seal.



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# Product Directory

To find headings easily, look for capital letters at top of each page to denote locations.

## ABRASIVE CLOTH, Paper and Belt

Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.  
Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

## ABRASIVES

See Discs, Abrasive

## ABRASIVES, HONING

Barnes Drill Co., 814 Chestnut St., Rockford, Ill.

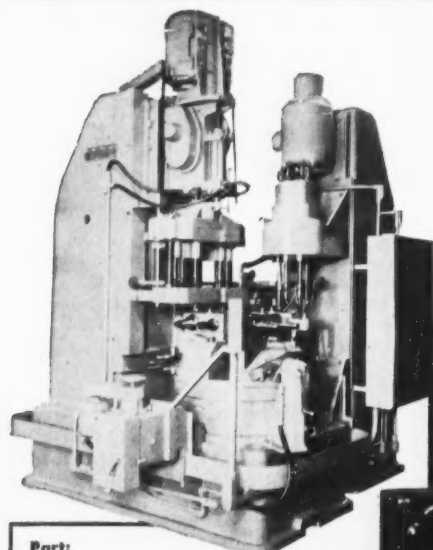
## ABRASIVES, Polishing, Tumbling, Etc.

Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Simonds Abrasive Co., Tacony and Fraley Sts., Bridesburg, Philadelphia, Pa.

## ACCUMULATORS, Hydraulic

American Steel Foundries, Elmes Engineering Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.

Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.  
Morgan Engineering Co., Alliance, Ohio  
Vickers, Inc., 1402 Oakman Blvd., Detroit, Mich.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.



### Part:

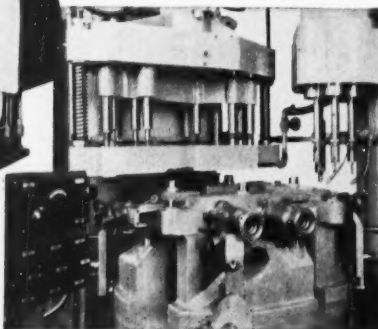
Steering gear housing. (Two different parts run on same machine with tool change only.)

Material: Malleable iron.

Operation: Station 1—Load and unload, Station 2—Drill (3) .368" holes; (1) .120" hole. Station 3—Combination spot face and chamfer (3) holes, drill (1) 23/32" hole for tapping. Station 4—Tap (3) 7/16"-14 NC-3 thread; tap 1/2"-14 NPSF thread.

Description: Millholland 4-station automatic index machine equipped with 4-station automatic index table, with 1 No. 5 Millholland Automatic Unit driven by 7-1/2 HP motor with 8-spindle ball bearing multiple head for drilling 5 holes and combination spot facing and chamfering 3 holes; 4-spindle tapper on right-hand column.

Operator loads part and pushes button initiating automatic cycle, unloads. Two parts machined at a time.



## MILLHOLLAND ENGINEERED FOR MAXIMUM PRODUCTION

For special production machines, Millholland Automatic Units offer distinct advantages. These self-contained units, driven by individual motors, are readily adapted to a wide range of operations. Their full automatic cycle with interlocked controls permits several units to be grouped for simultaneous operations, or they can be mounted on other production machines and synchronized to perform additional operations. Millholland Automatic Units have proved themselves in 30 years of outstanding performance on all types of jobs. Get full details in Bulletin M-6.

**W. K. MILLHOLLAND MACHINERY CO.**  
6402 Westfield Blvd., Indianapolis 2, Indiana

**AIR HOISTS**—See Hoists, Air.

**AIR TOOLS**—See Grinders, Pneumatic; Drills, Portable Pneumatic, Etc.,

## ALLOY STEELS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Carpenter Steel Co., Reading, Pa.  
Columbia Tool Steel Co., Lincoln Hwy. & State St., Chicago Heights, Ill.  
Crucible Steel Co. of America, Chrysler Bldg., New York 1, N. Y.  
Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Republic Steel Corp., Union Drawn Steel Div., Republic Bldg., Cleveland, Ohio.  
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
U. S. Steel Corp., Carnegie-Illinois Steel Corp. Div., 436 7th Ave., Pittsburgh, Pa.  
Vanadium Alloys Steel Co., Latrobe, Pa.  
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

## ALLOY STEELS, High Temperature

Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.

## ALLOYS, Non-Ferrous

American Brass Co., 25 Broadway, New York.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.  
Mueller Brass Co., Port Huron 35, Mich.  
Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

## ALLOYS, Zinc

New Jersey Zinc Co., 160 Front St., New York, N. Y.

## ARBOR PRESSES

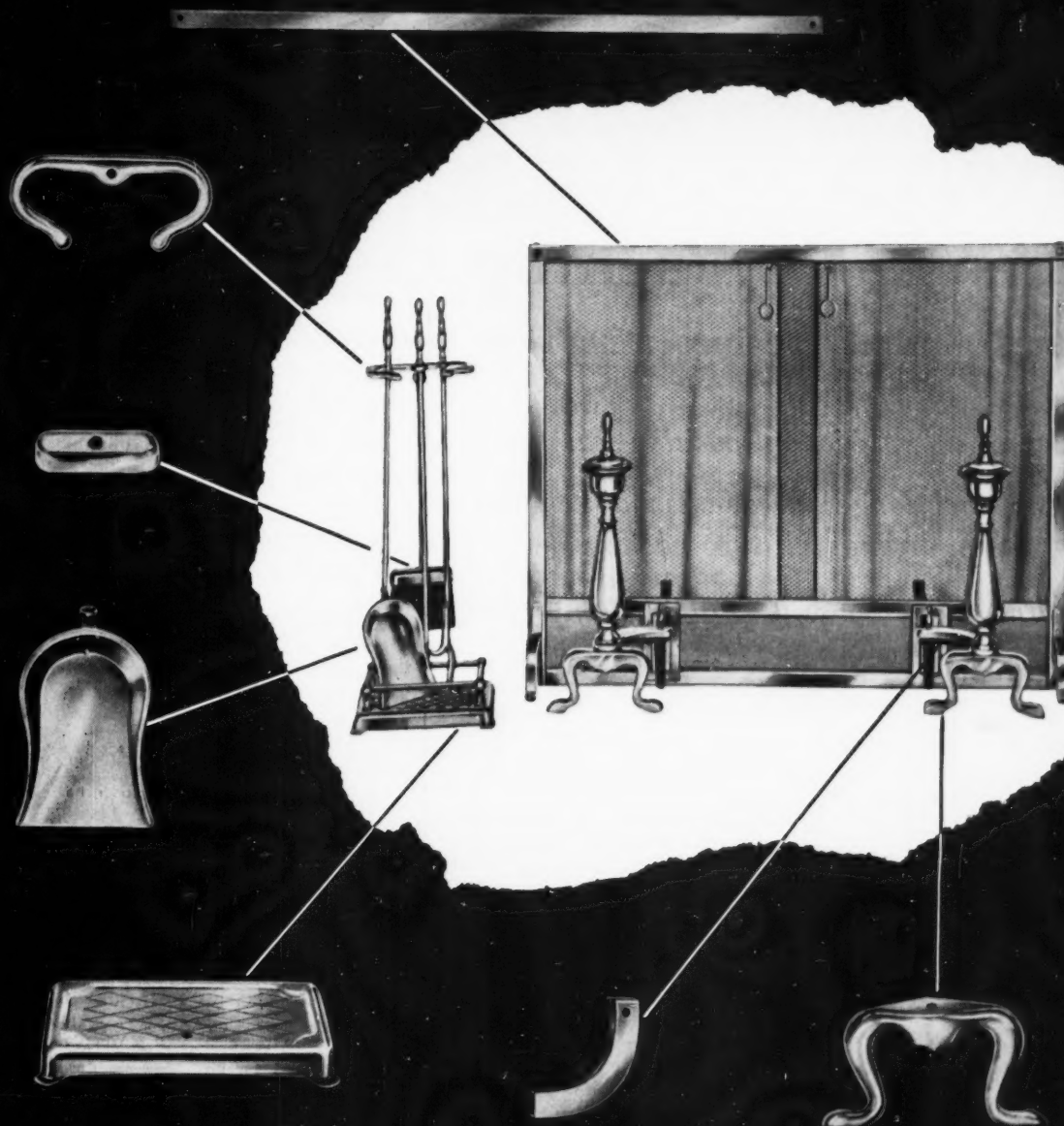
See Presses, Arbor

## ARBORS AND MANDRELS

Amco Gage Co., 19760 W. 8 Mile Rd., Detroit 19, Mich.  
Beaver Tool & Engineering Corp. (Arbors, only), 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.  
Dorly Machine Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, Ill.  
Erickson Tool Co., 2309 Hamilton, Cleveland, Ohio  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
Gorton, George Mch. Co., 1110 W. 13th St., Racine, Wis.  
Jacobs Mfg. Co., West Hartford, Conn.  
Kemp Smith Machine Co., 1819 S. 71st St., Milwaukee 14, Wis.  
Keo Cutters, 19326 Woodward, Detroit, Mich.  
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.  
National Twist Drill & Tool Co., Rochester, Mich.

(Continued on page 284)





FORMBRITE'S SUPERFINE grain structure enables Special Products Co. to buff this equipment in half the time necessary with ordinary brasses.

## New kind of brass called "FORMBRITE" cuts finishing costs

The bright, lustrous finish you see on this fireplace equipment — made of FORMBRITE® sheet metal — is the result of a simple color buff that took about half the time previously required. FORMBRITE's appearance after buffing speaks for itself.

FORMBRITE's superfine grain structure provides a surface far superior to ordinary drawing brasses. In every case, it's meant important savings in finishing costs...and improved product quality.

FORMBRITE is readily formed, drawn or embossed . . . results in products that are harder, stronger, "springier"

and more scratch-resistant.

But don't take our word for it. Read what others say about this specially processed drawing brass:

**Niagara Searchlight Corp.** — "Cuts polishing and buffing time on flashlight end caps 50% . . . plating and general quality are improved, too."

**Aeroplane Tackle Mfg. Co.** — "We cut polishing costs over 25% . . . on several stamped products we get the required finish by a simple tumbling before lacquering or plating."

**Sheaffer Pen Co.** — "Savings in polishing costs are as high as 50%. Formbrite

gives us a longer-lasting product."

Yet with all the plus values FORMBRITE offers over conventional brasses it costs no more. You can do it better, faster and cheaper with FORMBRITE. Want a sample? More information? Write: *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* Reg. U. S. Pat. Off. 6488

# Formbrite

an ANACONDA® product

made by The American Brass Company

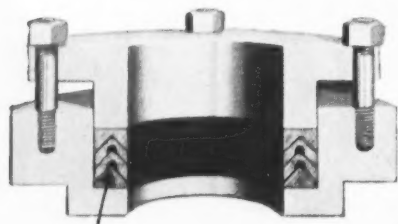
Why users prefer



# CHEVRON\* Packing

for rams, plungers, reciprocating rods

1. Assures a low friction, positive seal
2. Lasts much longer, needs less maintenance than ordinary V-type packing
3. Works efficiently in a shallow stuffing box



Note the exclusive hinge-like construction of CHEVRON packing.



Garlock 431  
CHEVRON  
Packing

GARLOCK CHEVRON Packing is entirely different from ordinary V-type packings. With *increasing* pressures CHEVRON rings tighten and prevent leakage; with *decreasing* pressures the packing eases off and permits operation with a minimum of friction.

Service reports, such as those below, prove that CHEVRON packing seals better and lasts longer.

► On hydraulic press—40" ram, 6,000 p.s.i., ram honed and chrome plated, gland machined to give clearance of .006" between gland and ram. Garlock 431 CHEVRON size 40" x 4 1/2" x only 2" deep gave 14 years service.

► On a machine with hydraulically operated clutches—3/4" cylinder, maximum pressure 500 p.s.i., service intermittent, maximum travel 3/4". First used cups, then "O" rings, neither of which worked well. Now packed with Garlock 431 CHEVRON 3/8" x 3/4" x 1 1/2" deep and doing a smooth, positive sealing job.

Ask your Garlock representative to give you all the cost-saving facts about CHEVRON packing, or write for folder AD-115.

## THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

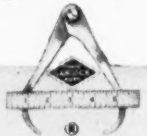
**Sales Offices and Warehouses:** Baltimore • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Denver • Detroit • Houston • Los Angeles • New Orleans • New York City • Palmyra (N.Y.) • Philadelphia • Pittsburgh • Portland (Ore.) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa.

**In Canada:** The Garlock Packing Company of Canada Ltd., Toronto, Ont.

\*Registered Trademark

# GARLOCK

PACKINGS, GASKETS, OIL SEALS, MECHANICAL SEALS  
RUBBER EXPANSION JOINTS



Pratt & Whitney, West Hartford 1, Conn.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Supreme Products, Inc., 2222 So. Calumet, Chicago 16, Ill.  
Union Twist Drill Co., Athol, Mass.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

### BABBITT

Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.  
Johnson Bronze Co., New Castle, Pa.  
Ryerson, Jos. T., & Son, 2558 W. 16th St., Chicago 18, Ill.

### BALANCING EQUIPMENT

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, Ill.  
Cosa Corp., 405 Lexington Ave., New York 17.  
Gisholt Machine Co. (Static and Dynamic), 1245 E. Washington Ave., Madison 10, Wis.  
Keller Tool Co., Grand Haven, Mich.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Pape Machinery Corp., Haverhill, Mass.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

### BALLS

Kennametal, Inc., Latrobe, Pa.

### BARS, Phosphor Bronze

Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.  
Johnson Bronze Co., New Castle, Pa.

### BARS, Steel

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Carpenter Steel Co., Reading, Pa.  
Columbia Tool Steel Co., Lincoln Hwy. & State St., Chicago Heights, Ill.  
Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.  
Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Republic Steel Corp., Union Drawn Steel Div., (Cold Drawn), Republic Bldg., Cleveland, Ohio.  
Ryerson Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
Summerill Tubing Co., Div. Columbia Steel & Shaffing Co., P. O. Box 1557, Pittsburgh 30, Pa.  
Timken Roller Bearing Co., Canton, Ohio.  
U. S. Steel Corp. (American Steel & Wire Co. Div., Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.  
Wheeler, Lovejoy & Co., Inc., Cambridge, Mass.

### BASES, Machinery Welded

Mahon, R. C., Co., 6565 E. 8 Mile Rd., Detroit 34, Mich.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.

### BEARINGS, Babbitt

Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.  
Johnson Bronze Co., New Castle, Pa.  
Link-Belt Co., 2410 W. 18th St., Chicago 8, Ill.

### BEARINGS, Ball

Ball & Roller Bearing Co., Danbury, Conn.  
Boston Gear Works, 3200 Main St., North Quincy, Mass.  
Fafnir Bearing Co., New Britain, Conn.  
Kaydon Engineering Corp., McCracken St., Muskegon, Mich.  
Link-Belt Co., 519 N. Holmes Ave., Indianapolis 6, Ind.  
Marlin-Rockwell Corp., 402 Chandler Bldg., Jamestown, N. Y.  
New Departure Div., General Motors, Bristol, Conn.  
Nice Ball Bearing Co., Nicetown, Philadelphia, Pa.  
Norma-Hoffman Bearings Corp., Stamford, Conn.  
Torrington Co., Torrington, Conn.

(Continued on page 286)

# WANT A NEW LEASE ON PROFITS?

## KEMPSMITH HAS ANSWERS FOR THAT '54 DOLLAR-QUESTION!

To meet the stiffer competition in 1954 you cannot afford to burden your milling machines by paying extra overhead charges to absentee owners. When you own your Kempsmith milling machines, you pay yourself the full dividends on your investment. Outright ownership of a modern Kempsmith milling machine will help you hold your profit-line and remain competitive. By **BUYING** Kempsmith milling machines you can eliminate "double-charges" on your job costs.

You can buy KEMPSMITHS at reasonable cost . . . because they are designed to avoid costly non-essentials. Their practical performance advantages keep costs low for operation and maintenance.

Get KEMPSMITH Millers and you get a new lease on profits.

• *You'll find* interesting data in

Bulletin No. 134 on the new

**IMPROVED TYPE "G" KEMPSMITH MILLING MACHINES**

*Write for this Bulletin Now!*

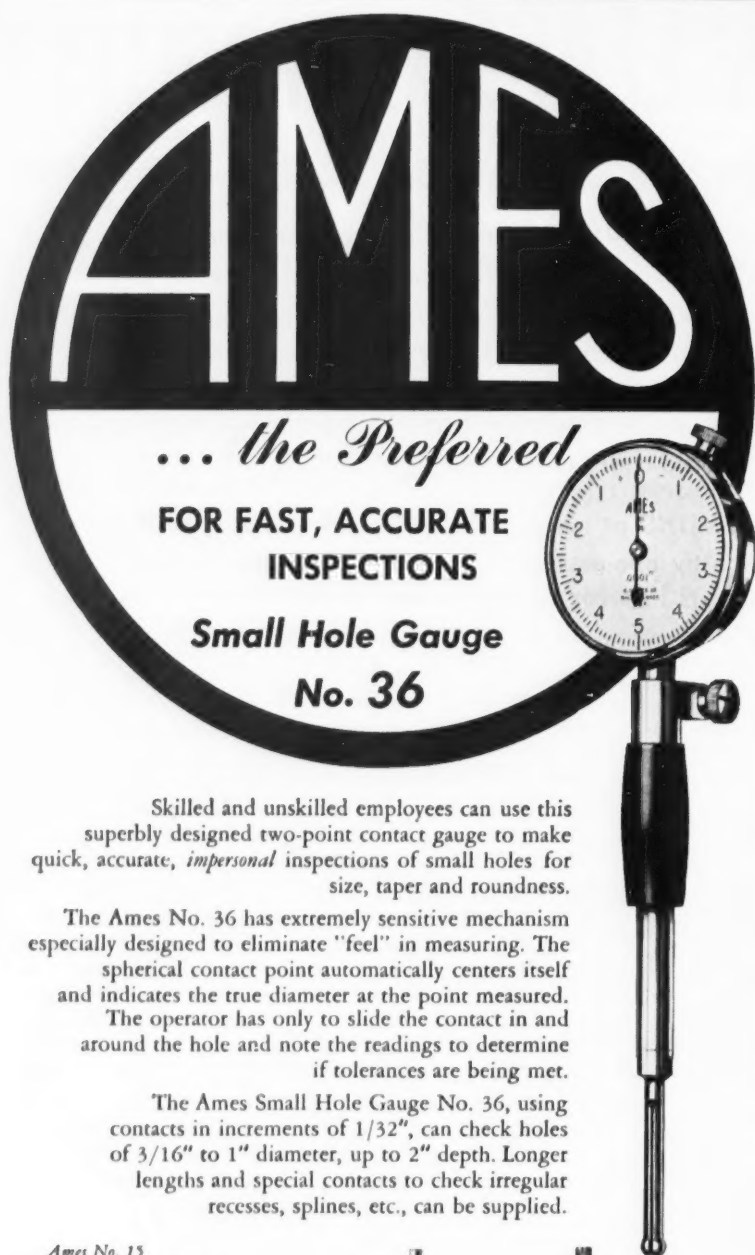
The advertisement features three overlapping brochures. The leftmost brochure is titled "KEMPSMITH Improved Type 'G' MILLING MACHINES" and shows a large industrial machine with a text box that reads "Sizes 1, 2 & 3 Plain and Universal Models" and "PRECISION BUILT MILLING MACHINES SINCE 1898". The middle brochure is titled "KEMPSMITH Improved Type 'G' MACHINES" and shows a smaller machine. The rightmost brochure is titled "KEMPSMITH Attachments that STEP UP PRODUCTION" and shows various machine attachments. Below the brochures, the text "KEMPSMITH MACHINE COMPANY - MILWAUKEE, WISCONSIN, U. S. A." is printed. At the bottom, a large "KEMPSMITH" logo is displayed, with "PRECISION-BUILT MILLING MACHINES FOR 1954 PERFORMANCE" written below it.

THERE'S A  
KEMPSMITH DISTRIBUTOR  
NEAR YOU...  
*Contact him*  
or write to

KEMPSMITH MACHINE CO., MILWAUKEE 14, WISCONSIN, U. S. A.

# KEMPSMITH

PRECISION-BUILT MILLING MACHINES FOR 1954 PERFORMANCE



**AMES**

*... the Preferred*

**FOR FAST, ACCURATE  
INSPECTIONS**

**Small Hole Gauge  
No. 36**

Skilled and unskilled employees can use this superbly designed two-point contact gauge to make quick, accurate, *impersonal* inspections of small holes for size, taper and roundness.

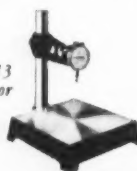
The Ames No. 36 has extremely sensitive mechanism especially designed to eliminate "feel" in measuring. The spherical contact point automatically centers itself and indicates the true diameter at the point measured. The operator has only to slide the contact in and around the hole and note the readings to determine if tolerances are being met.

The Ames Small Hole Gauge No. 36, using contacts in increments of  $1/32$ ", can check holes of  $3/16$ " to 1" diameter, up to 2" depth. Longer lengths and special contacts to check irregular recesses, splines, etc., can be supplied.

Ames No. 15  
Jaw Gauge



Ames No. 13  
Dial Comparator



Ames No. 516  
Dial Micrometer



Ames No. 25  
Pocket Thickness  
Measure



*If you would like to have our recommendations on your measurement problem, send blueprints and specifications. Write for your free copy of catalog on Ames precision measuring instruments.*



Representatives in  
principal cities

**B. C. AMES CO.**

27 Ames Street  
Waltham 34, Mass.

Mfg. of Micrometer Dial Gauges • Micrometer Dial Indicators

#### BEARINGS, Bronze and Special Alloy

Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.  
Johnson Bronze Co., New Castle, Pa.  
Link-Belt Co., 2410 W. 18th St., Chicago 8, Ill.

#### BEARINGS, Lineshaft

Fafnir Bearing Co., New Britain, Conn.  
Link-Belt Co., 519 N. Holmes Ave., Indianapolis 6, Ind.  
Orange Roller Bearing Co., Inc., Orange, N. J.  
Standard Pressed Steel Co., Jenkintown, Pa.

#### BEARINGS, Needle

Kaydon Engineering Corp., McCracken St., Muskegon, Mich.  
Orange Roller Bearing Co., Inc., Orange, N. J.  
Torrington Co., Torrington, Conn.

#### BEARINGS, Roller

Ball & Roller Bearing Co., Danbury, Conn.  
Fafnir Bearing Co., New Britain, Conn.  
Hyatt Bearings Div., Harrison, N. J.  
Kaydon Engineering Corp., McCracken St., Muskegon, Mich.  
Link-Belt Co., 519 N. Holmes Ave., Indianapolis 6, Ind.  
Marlin-Rockwell Corp., 402 Chandler Bldg., Jamestown, N. Y.  
Norma-Hoffman Bearings Corp., Stamford, Conn.  
Orange Roller Bearing Co., Inc., Orange, N. J.  
Rollway Bearings Co., Inc., 541 Seymour St., Syracuse, N. Y.  
Timken Roller Bearing Co., Canton, Ohio.  
Torrington Co., Torrington, Conn.

#### BEARINGS, Self-Lubricating (Oilless)

Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.  
Johnson Bronze Co., New Castle, Pa.

#### BEARINGS, Tapered Roller

Kaydon Engineering Corp., McCracken St., Muskegon, Mich.  
Timken Roller Bearing Co., Canton, Ohio.  
Torrington Co., Torrington, Conn.

#### BEARINGS, Thrust

Ball & Roller Bearing Co., Danbury, Conn.  
Boston Gear Works, 3200 Main St., North Quincy, Mass.  
Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.  
Fafnir Bearing Co., New Britain, Conn.  
General Electric Co., Schenectady, N. Y.  
Kaydon Engineering Corp., McCracken St., Muskegon, Mich.  
Link-Belt Co., 519 N. Holmes Ave., Indianapolis 6, Ind.  
Marlin-Rockwell Corp., 402 Chandler Bldg., Jamestown, N. Y.  
Nice Ball Bearing Co., Nicetown, Philadelphia, Pa.  
Norma-Hoffman Bearings Corp., Stamford, Conn.  
Orange Roller Bearing Co., Inc., Orange, N. J.  
Rollway Bearing Co., Inc., Syracuse, N. Y.  
Timken Roller Bearing Co., Canton, Ohio.  
Torrington Co., Torrington, Conn.

#### BELT SHIFTERS

Standard Pressed Steel Co., Jenkintown, Pa.

#### BELTING, TRANSMISSION

Houghton, E. F. & Co., 303 W. Lehigh Ave., Philadelphia, Pa.  
Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6, Ind.

(Continued on page 288)



# Bodine CASE HISTORY NO. 37

1 Feedload part to clamping fixture.

2 Automatically position loading lever.

3 Inspect for part and proper positioning in fixture.

4 Automatically clamp.

5 Spot face  $\frac{3}{8}$ " dia. maintaining depth to  $\pm .002$ ".

6 Automatically hopper feed, transfer and insert Oilite bushing.

7 Drill 4 - #31 dia. (.120") holes and 1 - .1235" dia. hole (angularly mounted multiple drill head).

8 Tap 2 holes #10-32 with angularly mounted 2-spindle tap head.

9 Size I.D. of Oilite bushing to .3735" - .3745" dia.

10 Automatically unload and return loading lever.

11 Unloading.

## PROCESSING WINDSHIELD WIPER MOTOR HOUSINGS

### PRODUCTION

One piece per stroke . . . 20 strokes per min.  
— 1000 pieces per 50-min. hour. 10,000 individual operations per 50-min. hour.

### MATERIAL

S.A.E. #925 Die Casting (Parts No. EMG-2, EMG-3, right- and left-hand).

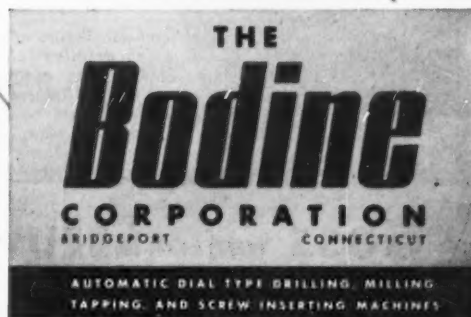
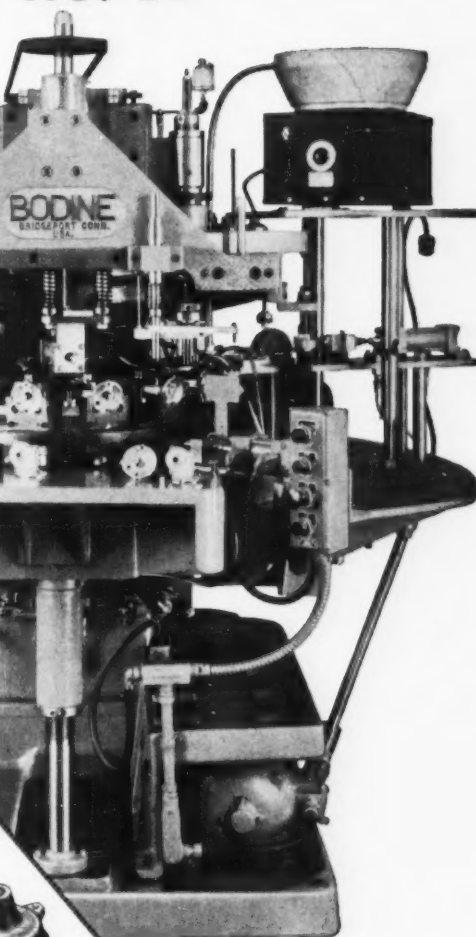
### TOLERANCES

(Other than specified above) Drilled holes: Size .001".  
Location:  $\pm .002$ ". Tapped holes: Class 2 threads.

### MACHINE

Bodine Model 42-30 Drilling, Tapping, Assembling Machine.  
Write us for Bodine Brochure M-6 "12 Case Histories."

*"You Can't Meet Tomorrow's Competition  
With Yesterday's Machine Tools."*



18D54

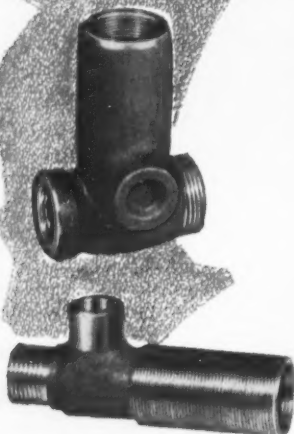
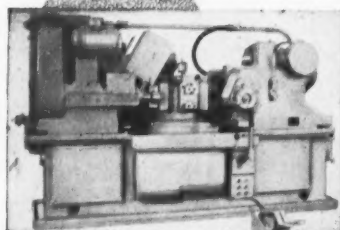
For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—287



# GOSS and DE LEEUW

## AUTOMATIC CHUCKING MACHINE



*means a complete piece...  
at each index cycle*

When a piece is finished it is completely finished without the necessity of a second operation. Furthermore it means more finished pieces in a given period of time and greater accuracy in every finished piece.

The "1-2-3" Method is exclusive with Goss & DeLeeuw. With it, three ends of a piece can be machined at a single chucking of the work, simultaneously or in sequence depending on the operations involved. It will pay you to investigate.

Send for illustrated literature giving detailed information. Send samples and ask us to give you cost estimates of handling this work on a "1-2-3" Goss & DeLeeuw Automatic Chucking Machine.



# GOSS and DE LEEUW

MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

### BENCHES, Work, and Bench Legs

Standard Pressed Steel Co., Jenkintown, Pa.

### BENDING MACHINES, Angle Iron, Plate, Etc.

Consolidated Mch. Tool Corp., 565 Blossom Rd., Rochester, N. Y.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.

### BENDING MACHINES, Hydraulic

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
Hydraulic Press Mfg. Co., 30 Lincoln Ave., Mt. Gilead, Ohio.  
Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.  
Morgan Engineering Co., Alliance, Ohio.  
Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
Watson Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

### BENDING MACHINES, Pipe

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

### BLAST CLEANING EQUIPMENT

Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.  
Pangborn Corp., Hagerstown, Md.  
Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

### BLOWERS

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Ingersoll-Rand Co., Phillipsburg, N. J.

### BLUING LAYOUT

Dykem Co., 2303 P. N. 11th St., St. Louis 6, Mo.

### BOILER TUBES

Bethlehem Steel Co., Bethlehem, Pa.  
Republic Steel Corp., Steel and Tubes Div., Republic Bldg., Cleveland 1, Ohio.  
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
U. S. Steel Corp., National Tube Co., Div., 436 7th Ave., Pittsburgh, Pa.

### BOLT AND NUT MACHINERY

Ajax Mfg. Co., Euclid, Cleveland 17, Ohio.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
Landis Machine Co., Inc., Waynesboro, Pa.  
National Machinery Co., Tiffin, Ohio.  
New Britain Machine Co., New Britain-Gridley Mch. Div., New Britain, Conn.

### BOLTS AND NUTS

Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y. (Stainless Steel only)  
Bethlehem Steel Co., Bethlehem, Pa.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.  
Ottemiller, W. H., & Co., York, Pa.  
Republic Steel Corp., Bolt & Nut Div., Republic Bldg., Cleveland 1, Ohio.  
Russell, Burdall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y.

### BOLTS, T-Slot

O. K. Tool Co., Milford, N. H.

(Continued on page 290)

# WHY IT PAYS TO BUY SPECIALTIES FROM US



You get quality products, fast delivery—anywhere

## TRIPLE SECURITY

What you want  
When you want it  
At the right price

• Maybe you didn't know it, but U. S. Steel Supply can supply you with everything you need in the way of industrial supplies, as well as with the steel you need.

Call us for—Dardelet Rivet Bolts, High Strength Bolts, Blakled (a new rust-inhibiting material), Grinding Wheels, expanded metal, chain and chain slings, welding electrodes, welding machines, clamps, Markal

Paintstiks, Galv-Weld (for regalvanizing welded areas), mechanical rubber goods—conveyor belts, transmission belts, all types of hose, V-Belts, structural fabricating machinery, sheet metal machinery.

These items are carried in stock ready for immediate delivery. For complete information and literature, fill out the coupon below and send to us.

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Please send me your free literature  
describing the following items:

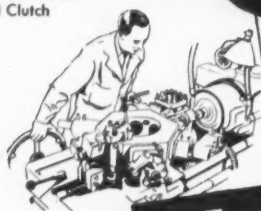
Name .....  
Company .....  
Address .....  
City ..... State .....

UNITED STATES STEEL



**Demanded by Designers**

Model MTU  
(duplex) Machine  
Tool Clutch



**Expected by Users**

The adaptability of standard Twin Disc Machine Tool Clutches to a wide variety of industrial applications has led leading machine tool designers to demand them—leading users to expect them.

Twin Disc Machine Tool Clutches are demanded because . . . where tough work cycles are figured in fractional seconds . . . they deliver *split second* engagement and disengagement repeatedly, smoothly and accurately—and maintain high torque capacity and clamping

efficiency throughout their long wear life.

Twin Disc Machine Tool Clutches are *standard* in leading makes of machine tools the world over. They are available in oil and dry type, single and duplex, in sizes from 3" to 12", and with torque capacities up to 2355 foot-pounds.

Write for Bulletin No. 134-B, which gives complete data on the Twin Disc Model MTS and Model MTU Machine Tool Clutches, or ask your nearest Factory Branch for assistance.

Built for a Long Life . . .

Backed for a Lifetime



**TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois**

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

#### BOOKS, Technical

Industrial Press, 148 Lafayette St., New York 13, N. Y.  
Lincoln Electric Co., 22801 St. Clair Ave., Cleveland, Ohio.

#### BORING AND DRILLING MACHINES

Baker Bros., Inc., Sta. F, P. O. Box 101, Toledo 10, Ohio.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Canedy-Otto Div. Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Foote-Burt Co., 1300 St. Clair Ave., Cleveland 8, Ohio.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.  
Moline Tool Co., 102 20th St., Moline, Ill.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.  
Wales-Strippit Corp., N. Tonawanda, N. Y.

#### BORING AND TURNING MILLS, Vertical

American Steel Foundries, King Mch. Tool Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.

#### BORING BARS

Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.  
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Erickson Tool Co., 2309 Hamilton, Cleveland, Ohio.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Firth Sterling, Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Gairing Tool Co., 21225 Hoover Rd., Detroit 32, Mich.  
Homesstrand Inc., Larchmont, N. Y.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.  
McCroskey Tool Corp., 1938 Thomas St., Meadville, Pa.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Universal Engineering Co., Frankenmuth 2, Mich.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### BORING, DRILLING AND MILLING MACHINES, Horizontal

(Floor, Planer or Table Types)

Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio.  
Cosa Corp., 405 Lexington Ave., New York 17.  
Espan-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa.  
Ex-Cell-O Corp., 120 Oakman Blvd., Detroit 32, Mich.  
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Gray, G. A., Co., Woodburn Ave. and Penn. R. R., Evanston, Cincinnati, Ohio.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Lucas Mch. Tool Div., New Britain Mch. Co., 12302 Kirby Ave., Cleveland 8, Ohio.  
Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.

(Continued on page 292)

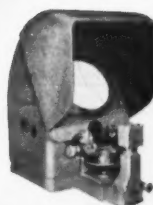


**11 MODELS**

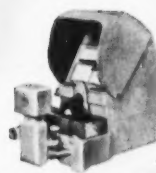
**3 SCREEN SIZES**



Pedestal Type  
14" Diam. Screen



Bench Type  
14" Diam. Screen  
4 Models



Bench Type  
3 1/2" x 7 1/4" Screen  
3 Models

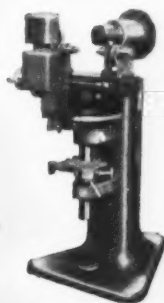
## Unsurpassed Inspection Versatility JONES & LAMSON OPTICAL COMPARATORS The Essence of Quality Control

Jones & Lamson Optical Comparators are designed and built like rugged machine tools to withstand vibration and hard use. Yet they have the built-in accuracy to satisfy the most exacting laboratory standards.

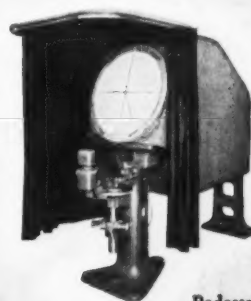
- They meet the requirements of toolroom, laboratory and production inspection.
- They precisely measure height, depth, lead or spacing, as well as angles to degrees and minutes. They will measure to .0001".
- They compare intricately contoured parts with a master outline—and measure the amount of error.
- They are convenient to operate, easy to set up and read direct—without computation.
- They operate under normal lighting conditions. *No darkroom is needed.*
- They will photograph the enlarged shadow and record its relationship to a master chart.
- Several persons may study the shadow *at the same time.*
- They will inspect and measure surface contours, as well as profiles of objects such as type faces, stamping dies, punches, worn tools, etc.



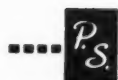
Vertical Type  
14" Diam. Screen



Direct  
Projection  
Type



Pedestal Type  
30" Diam. Screen



A complete line of STANDARD CHARTS  
and FIXTURES is maintained by us.

**JONES & LAMSON**

JONES & LAMSON MACHINE COMPANY  
512 Clinton St., Springfield, Vt., U.S.A.



Machine Tool Craftsmen  
Since 1835

COMPARATOR DIV.  
Dept. 710



Jones & Lamson Machine Company  
512 Clinton Street, Dept. 710  
Springfield, Vermont, U. S. A.  
Please send Comparator Catalog No. 402.

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

For more information on products advertised, use Inquiry Card, page 245

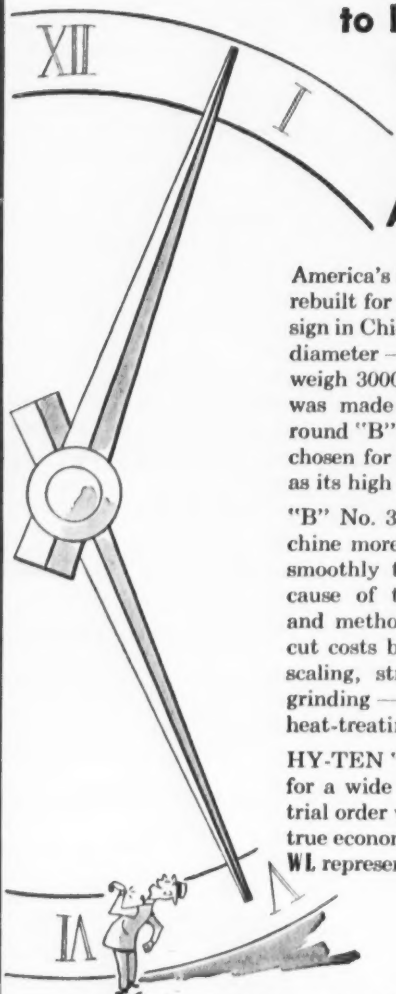
MACHINERY, June, 1954—291

OVER ONE HUNDRED YEARS OF CONTINUOUS SERVICE. ROUNDS, SQUARES, FLATS, HEXAGONS, OCTAGONS

# it's the right time

to Investigate the  
Qualities of

**HY-TEN**  
**ALLOY STEEL**



America's largest clock was recently rebuilt for a spectacular illuminated sign in Chicago. It measures 50 ft. in diameter—hands and movement weigh 3000 lbs. The new driveshaft was made from 6 ft. of 3½-inch round "B" No. 3X heat-treated bar, chosen for its machinability as well as its high physical properties.

"B" No. 3X heat-treated bars machine more readily and finish more smoothly than standard alloys because of their particular analysis and method of manufacture. They cut costs by eliminating distortion, scaling, straightening—and often grinding—as well as the cost of heat-treating finished parts.

HY-TEN "B" No. 3X bars are used for a wide range of applications. A trial order will convince you of their true economy. Just call your nearest WL representative.

Write today for your FREE COPIES of Wheelock, Lovejoy Data Sheets, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

**WHEELOCK,  
LOVEJOY  
& COMPANY, INC.**

**Warehouse Service**

CAMBRIDGE • CLEVELAND  
CHICAGO • HILLSIDE, N.J.  
DETROIT • BUFFALO  
CINCINNATI

In Canada

SANDERSON-NEWBOULD, LTD., MONTREAL

**HY-TEN**  
and **AISI**

138 Sidney St., Cambridge 39, Mass.

and Cleveland • Chicago • Detroit  
Hillside, N.J. • Buffalo • Cincinnati

292—MACHINERY, June, 1954

BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS

Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
Orban Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.

## BORING HEADS

Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.  
Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Gairing Tool Co., 21225 Hoover Rd., Detroit 32, Mich.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
McCrosky Tool Corp., 1938 Thomas St., Meadville, Pa.  
Mummert-Dixon Co., Hanover, Pa.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
Universal Engineering Co., Frankenmuth 2, Mich.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

## BORING MACHINES

Bryant Chucking Grinder Co., Springfield, Vt.  
Chandler Tool Co., 514 Ohio Ave., Muncie, Ind.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.  
National Automatic Tool Co., Inc., 5. 7th and N Sts., Richmond, Ind.  
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Simplex Machine Tool Corp., 4528 W. Mitchell St., Milwaukee, Wis.

## BORING MACHINES, Jig

American Sip Corp., 100 E. 42nd St., New York 17, N. Y.  
Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.  
Cleereman Mch. Tool Co., Green Bay, Wis.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Wales-Strippit Corp., N. Tonawanda, N. Y.

## BORING TOOLS

American Steel Foundries, King Mch. Tool Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.  
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Atrax Co., Newington, Conn.  
Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Carboloy Dept., General Electric Co., Box 237 Roosevelt Park Annex, Detroit 32, Mich.  
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Gairing Tool Co., 21225 Hoover Rd., Detroit, Mich.  
Giddings & Lewis Mch. Tool Co., Fond du Lac, Wis.  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.  
Kennametal Inc., Latrobe, Pa.  
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.  
McCrosky Tool Corp., 1938 Thomas St., Meadville, Pa.  
Metal Carbides Corp., Youngstown, Ohio.

(Continued on page 294)

For more information on products advertised, use Inquiry Card, page 245

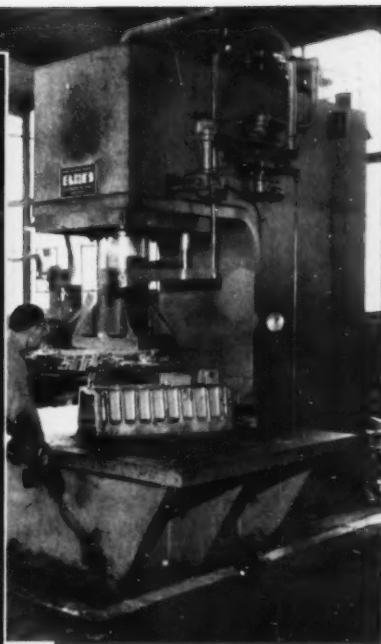


**TUBE PRODUCTS CORP.,  
TIPPECANOE, OHIO.**

"Ten Elmes Tube Bending Presses operated—six for four years—four for eight years—yet practically no maintenance is required. Presses work 16 hours daily 50% of the time."

**ELMES**  
HYDRAULIC  
PRESSES  
*At Work...for*

**PROFIT  
PROFIT  
PROFIT  
PROFIT**



**MAYNARD ELECTRIC  
STEEL CASTING CO.,  
MILWAUKEE, WISC.**

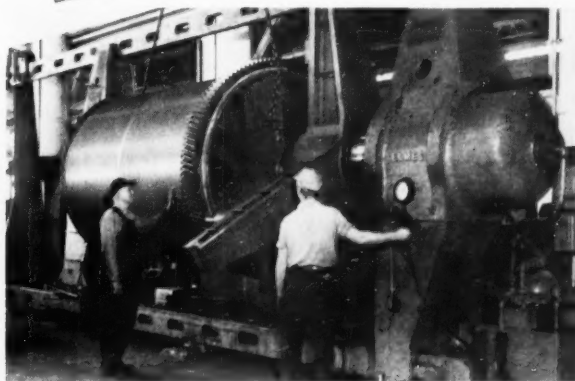
"Our Elmes 250-Ton Open-Side Press is 40% faster than press previously used for straightening castings—it is more accessible, more economical to operate."

Why not put your pressing problems up to Elmes? Skillful design and construction, backed by more than a solid century of engineering experience, make Elmes<sup>®</sup> Presses right for each job—for drawing and forming, straightening, bending, hobbing, forcing, etc. Wide range of standard designs—also special types built to your specific requirements. Recommendations and cost estimates are yours for the asking.



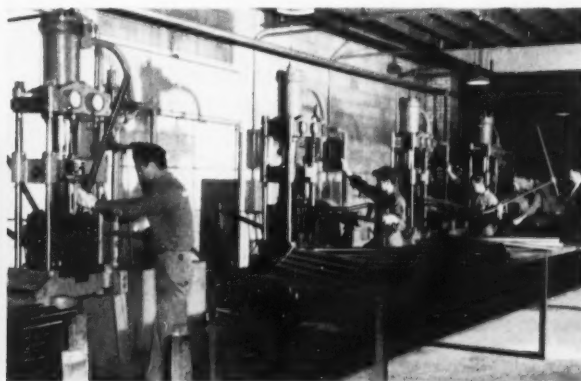
Write for Elmes  
Bulletin No. 1010-B  
"Hydraulic  
Metalworking  
Presses."

**See your Elmes  
Distributor or write  
to us direct**



**ALLIANCE MACHINE CO., ALLIANCE, OHIO.**

"Our Elmes 500-Ton Inclined Forcing Press makes possible 50% savings in costs of gear installations on crane hoisting drums." (Illustrated—hoisting drum for 400 ton ladle crane.)



**JAMES STEEL AND TUBE CO., HAZEL PARK,  
(DETROIT) MICHIGAN.**

"Four Elmes Tube Bending Presses produce 2000 tailpipes per 8-hour shift. Each tailpipe requires seven bends."



**AMERICAN STEEL FOUNDRIES**

**ELMES ENGINEERING DIVISION**

*hydraulic presses and equipment* . . . 1162 TENNESSEE AVE., CINCINNATI 29, OHIO

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—293

# Waterproof!

new CPL basic snap-action switch



Features complete sealing from effects of water, dirt and oils • Vibration resistant up to 240 g's • No resonance up to 7000 C.P.S. • Will take 2000 ft. lbs. shock test • Rated 10 amperes resistive 28 V. D.C. or 115 A.C. • Actuators made to fit individual requirements • Silicone, neoprene or vinyl molded cases • Wire leads from 6 inches to 48 inches optional

**CONTROL PRODUCTS • INC.**  
320 SUSSEX STREET • HARRISON • NEW JERSEY

*Manufacturers of Thermal Devices and Waterproof Switches*

Ave., Detroit 23, Mich.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.  
Union Twist Drill Co., Athol, Mass.  
Universal Engineering Co., Frankenthuth 2, Mich.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### BRAKES, Press and Bending

Bliss E. W., Co., 1375 Raff Road, S. W., Canton, Ohio.  
Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.  
Cleveland Crane & Engrg. Co., Wickliffe, Ohio.  
Columbia Div., Lodge & Shipley Co., Hamilton 1, Ohio.  
Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, Ill.  
Ferracuta Machine Co., Bridgeton, N. J.  
Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, Ill.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

#### BROACHES

American Broach & Mch. Co., Ann Arbor, Mich.  
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Lapointe Mch. Tl. Co., Tower St., Hudson, Mass.  
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
Zagar Tool Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

#### BROACHING MACHINES

American Broach & Mch. Co., Ann Arbor, Mich.  
Cincinnati Milling Mch. Co., Cincinnati, Ohio.  
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Foote-Burt Co., 130 St. Clair Ave., Cleveland 8, Ohio.  
Lapointe Mch. Tl. Co., Tower St., Hudson, Mass.  
Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
Wilson, K. R., 213 Mill St., Arcade N. Y.  
Zagar Tool Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

#### BRONZE

American Brass Co., Waterbury 20, Conn.  
Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.  
Johnson Bronze Co., New Castle, Pa.  
Mueller Brass Co., Port Huron 35, Mich.

#### BRUSHES, Industrial, Wire Wheel, Etc.

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio.

#### BUFFERS

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md. (Portable Elec.).  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.  
Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.

#### BULLDOZERS

Ajax Mfg. Co., Euclid, Cleveland 17, Ohio.  
American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Atrax Co., Newington, Conn.  
Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

(Continued on page 296)





For Atlantic Automatic Co., Cleveland, Ohio:

## Tool Life Increased Over 200%!



PARTS FOR GEARS & CAR TRANSMISSIONS are just a few of the many delicate machine tool products Atlantic turns out. Cities Service Chillo Cutting Oil has helped Atlantic maintain their great reputation for quality products.

For the services of a Cities Service Lubrication Engineer... Write Cities Service Oil Company, Sixty Wall Tower, New York City 5, New York.

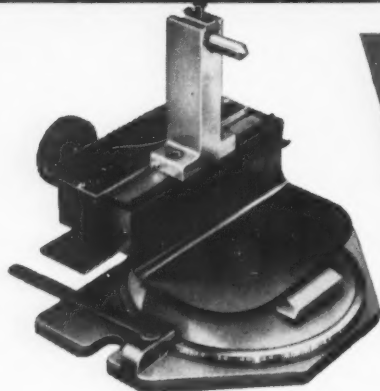


**"Cities Service Chillo Cutting Oil Has Proved To Be The Difference Between Ordinary And Quality Production In Our Shop!"**

Here's Atlantic Automatic's story in their own words: "One of our tougher jobs recently was machining SAE 446 Stainless Steel with two forming, one threading and three drilling operations. The critical operation was drilling a .025 inch diameter hole,  $\frac{1}{8}$  inch deep. The drill would soon pack with chips and break. When a Cities Service Lubrication Engineer was called in, he recommended our using Chillo 44.

"This light-colored oil did the trick. DOWN TIME WAS CUT IN HALF AND DRILL LIFE INCREASED OVER 200%!

"We use Cities Service Chillo 44 to machine all types of metals covering a range of machinability from brass to stainless on our Brown and Sharpe 00G, 0G and 2G Automatics. It has proved to be the difference between ordinary and quality production in our shop!"



**A  
Specialist  
is Your  
Best  
Bet**

The specialists who produce Vinco B-1 angle tangent to radius Dressers have skill and experience equal to that of industrial diamond cutters. The B-1 Dresser will dress contours on grinding wheels to an accuracy within .0001". This accuracy is assured for the life of the dresser by its good design, sturdy construction and anti-dust features. The B-1 Dresser can be used on surface grinders as well as internal, external, "multi-purpose" and tool and cutter grinders. Its accuracy and simplicity of operation take all of the "guess work" out of wheel dressing.

**FREE!** Send today for this booklet. It tells all about the B-1 Dresser . . . has tips on dressing angles tangent to radii.

VINCO CORP., 9113 Schaefer Hwy., Detroit 28, Mich.

Mass Produced Metal Component Parts • Aircraft and Commercial Gears • Master Gears • Spline Gages • Precisiondex • Gear Rolling Inspection Fixtures • Recording Camshaft Comparators • Optical Master Inspection Dividing Heads • Involute Checkers • Indicator Snap Gages.

**VINCO**

MILLIONTHS OF AN  
INCH FOR SALE

TRADEMARK OF DEPENDABILITY



Chambersburg Engrg. Co., Chambersburg, Pa.  
Lake Erie Engineering Corp., Kenmore Station  
Buffalo, N. Y.  
Watson-Stillman Co., Div., H. K. Porter Co.,  
Inc., Roselle, N. J.

#### BURS

See Files and Burs, Rotary

#### BUSHINGS, Brass, Bronze, Carbide, Etc.

Boston Gear Works, 3200 Main St., North  
Quincy, Mass.  
Bunting Brass & Bronze Co., Spencer and Car-  
lton Aves., Toledo, Ohio.  
Haynes Stellite Div., Union Carbide & Carbon  
Corp., 30 E. 42nd St., New York.  
Johnson Bronze Co., New Castle, Pa.  
Kennametal, Inc., Latrobe, Pa.

#### BUSHINGS, Hardened

Colonial Bushings, Inc., 31780 Groesbeck Hwy.,  
Fraser, Mich.  
Daryl Machine Specialties, Inc., 2107 S. 52nd  
Ave., Chicago 50, Ill.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit  
32, Mich.  
Leland-Gifford Co., 1025 Southbridge St.,  
Worcester, Mass.  
U. S. Steel Co., Inc., 436 7th Ave., Pittsburgh,  
Pa.  
U. S. Tool Co., Inc., 255 N. 18th St., Ampere,  
N. J.

#### BUSHINGS, Jig

Colonial Bushings, Inc., 31780 Groesbeck Hwy.,  
Fraser, Mich.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit  
32, Mich.  
Universal Engrg. Co., Frankenmuth, Mich.

#### CABINETS, Tool

Armstrong Bros. Tool Co., 5200 W. Armstrong  
Ave., Chicago, Ill.

#### CALIPERS

Alina Corp., 401 Broadway, New York 13, N. Y.  
Ames, B. C., & Co. (Dial), Waltham 54, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Millers Falls Co., Greenfield, Mass.  
Scherr, George, Co., Inc., 200 Lafayette St.,  
New York 12, N. Y.  
Starrett, The L. S. Co., Athol, Mass.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.

#### CAM CUTTING MACHINES

Cosa Corp., 405 Lexington Ave., New York 17,  
N. Y.  
Fellows Gear Shaper Co., Springfield, Vt.  
Frew Machine Co., 121 East Luray St., Phila-  
delphia 20, Pa.  
Hirschmann Co., Carl, 30 Park Ave., Man-  
hasset, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Sundstrand Machine Tool Co., 2531 11th St.,  
Rockford, Ill.

#### CAM MILLING AND GRINDING MACHINES

Baird Machine Co., 1700 Stratford Ave., Strat-  
ford, Conn.  
Hirschmann Co., Carl, 30 Park Ave., Man-  
hasset, N. Y.  
Landis Tool Co., Waynesboro, Pa.  
Orban Kurt Co., Inc., 205 East 42nd St.,  
New York 17, N. Y.  
Rowbottom Machine Co., Waterbury, Conn.

#### CAMS

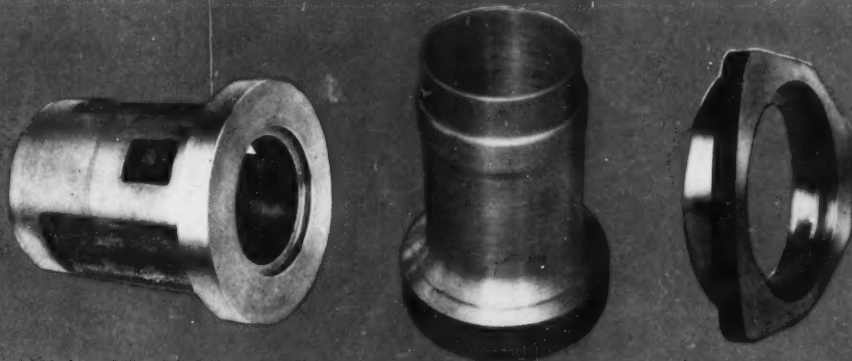
Eisler Engrg. Co., Inc., 760 S. 13th, Newark 3,  
N. J.  
Hartford Special Mchry. Co., 287 Homestead  
St., Hartford, Conn.  
Rowbottom Machine Co., Waterbury, Conn.

#### CARBIDES, TANTALUM, TITANIUM AND TUNGSTEN

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Carboloy Dept., General Electric Co., Box 237,  
Roosevelt Park Annex, Detroit 32, Mich.  
Firth Sterling, Inc., 3113 Forbes St., Pitts-  
burgh 30, Pa.  
Kennametal Inc., Latrobe, Pa.  
Metal Carbides Corp., Youngstown, Ohio.  
Super Tool Co., 21650 Hoover Rd., Detroit 13,  
Mich.  
Wesson Co., 1220 Woodward Heights Blvd.,  
Ferndale, Mich.  
Wesson Metal Corp., Lexington, Ky.  
Willey's Carbide Tool Co., 1340 W. Vernor  
Hwy., Detroit 1, Mich.

(Continued on page 298)

**big production jumps such as  
these actual jobs...**



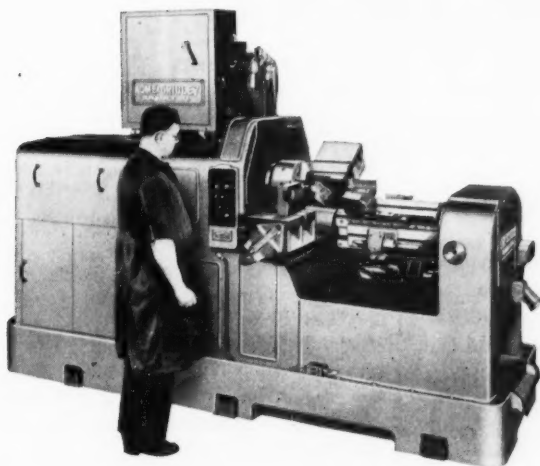
	FINGER HOLDER BODY 6 1/2" dia. Semi-steel	SEMI-FINISHED COLLET 5 3/8" dia. 4140 steel	BEARING RETAINER 9 1/4" dia. Luman alloy
Former Method	39.2 minutes	65 minutes	17.3 minutes
Model MC Time	11.2 minutes	13 minutes	6.0 minutes

can be made **ONLY** on the brand new

# 12"-UNIVERSAL

MODEL MC ACME-GRIDLEY

## Single Spindle Automatic Chuckers



General claims about this or any other new model machine can be facts **BUT** every experienced shop executive knows that only a comparison of specific net gains of new methods over old can justify his serious investigation.

For this reason we emphasize the unprecedented production gains on 3 chucking jobs, typical of the kind of time savings realized since we announced the new Acme-Gridley 12" Universal Single Spindle Chucker a year ago.

If you believe that similar facts on your particular chucking problems are worth your making such a comparison and if you are willing to be surprised by similar gains, guaranteed, your next move is to call in our engineers. General bulletin MC53 tells all about the design advantages.

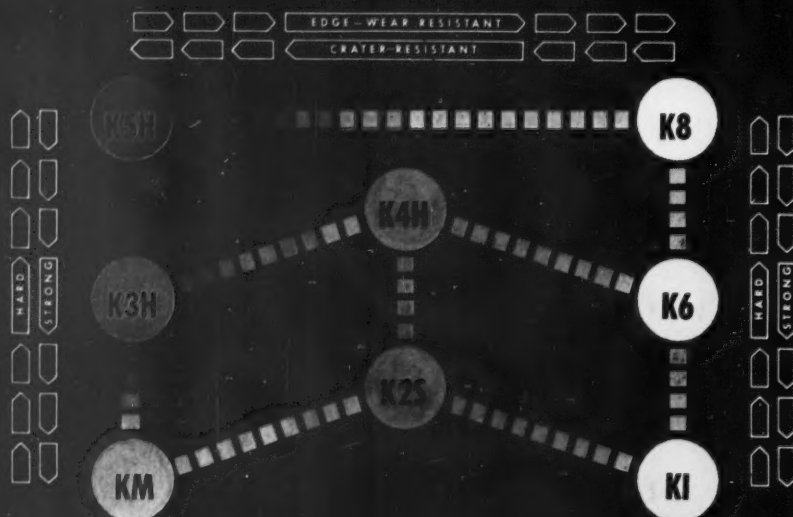
You can't do **TODAY'S** job  
with **YESTERDAY'S** tools—  
and be in business **TOMORROW**.

The **NATIONAL**  
**ACME COMPANY**

170 EAST 131st STREET • CLEVELAND 8, OHIO

**ACME-GRIDLEY BAR  
and CHUCKING AUTOMATICS**  
1-4-8 and 9 Spindle • Hydraulic  
Thread Rolling Machines • Auto-  
matic Threading Dies and Taps •  
Limit, Motor Starter and Control  
System • Switches • Solenoids •  
Contract Manufacturing





## **NOW- A Quick, Easy-to-Use Guide to Efficient Machining**

Here's the first simplified system for selecting carbide tool grades. Kennametal's new grade selection method assures top tool performance on every machining job. It's easy to use and eliminates guesswork because grades are grouped according to their wear characteristics (edge-wear and crater-resistant); also according to relative strength with strong, intermediate and hard grades included in each group. These eight Kennametal grades meet all machining requirements.

Kennametal's grading system is unmatched in the industry for simplicity. Any experienced machinist can use it to quickly adjust

grades for better tool performance. For example: If K3H is being used and crater is no problem, a switch to K4H, which is more edge-wear resistant, will provide longer tool life. Conversely, if K4H is being used and crater is excessive, a switch to K3H would improve tool life.

Your Kennametal representative will gladly help you apply this grade selection system to your machining operations. He can also help apply these eight grades to "wear spots" in your product, your processing lines, or any place a hard, wear-resistant metal is needed. Just give him a call. Kennametal Inc., Latrobe, Pa.

\*Registered Trade Marks



**KENNAMETAL**  
CEMENTED CARBIDE TOOLING  
THAT INCREASES PRODUCTIVITY

SALES OFFICES IN PRINCIPAL CITIES

A-13

### **C Product Directory**

#### **CASEHARDENING FURNACES**

See Furnaces, Heat-Treating

#### **CASTINGS, Aluminum, Brass, Bronze, Magnesium, Etc.**

Bethlehem Steel Co. (Brass and Bronze only), Bethlehem, Pa.  
Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.  
Mueller Brass Co., Port Huron 35, Mich.

#### **CASTINGS, Die**

American Brass Co., Waterbury 20, Conn.  
Lehigh Foundries, Inc., 1500 Lehigh Dr., Easton, Pa.  
Madison-Kipp Corp., Madison, Wis.

#### **CASTINGS, IRON**

Bethlehem Steel Co., Bethlehem, Pa.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Chambersburg Engineering Co., Chambersburg, Pa.  
Lehigh Foundries, Inc., 1500 Lehigh Dr., Easton, Pa.  
Link-Belt Co., 180 W. Duncannon Ave., Philadelphia 20, Pa.

#### **CASTINGS, Steel, Alloys, Etc.**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.  
Lebanon Steel Foundry, Dept. J, Lebanon, Pa.  
Link-Belt Co., 180 W. Duncannon Ave., Philadelphia 20, Pa.  
U. S. Steel Corp., Columbia Steel Co., Div., 436 7th Ave., Pittsburgh, Pa.

#### **CEMENT, Disc Grinding Wheel**

Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

#### **CENTERING MACHINES**

Consolidated Mch. Tool Corp., Rochester, N. Y.  
Espin-Lucas Machine Works, Front St., and Girard Ave., Philadelphia, Pa.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

#### **CENTERS, Lathe**

Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago, Ill.  
Firth Sterling, Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.  
Kennametal, Inc., Latrobe, Pa.  
Metal Carbides Corp., Youngstown, Ohio.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
Union Twist Drill Co. Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

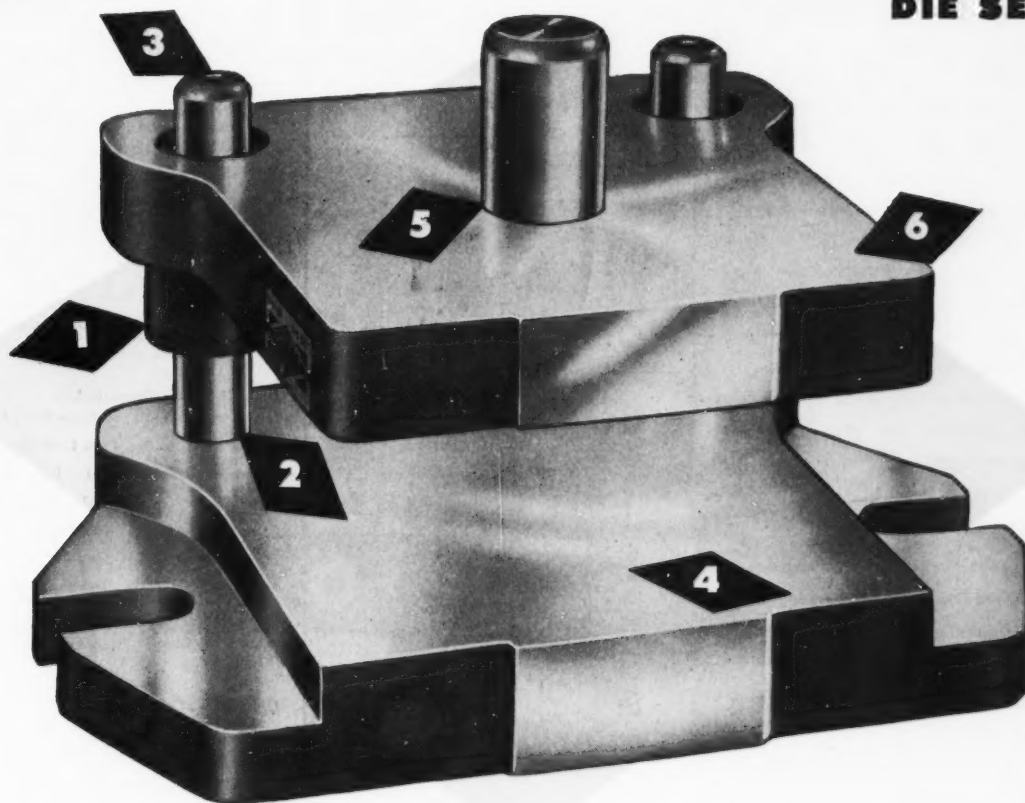
(Continued on page 300)





reasons for buying.. **PRODUCTO**

**DIE SETS**



1. Bushings have an absolutely uniform inside diameter, resulting in full-bearing and extra long life.

2. New design die set gives added strength and assures accurate location of pin and bushing holes.

3. Accuracy of guide pins and bushings are checked on light gauges reading to 50 millionths of an inch.

4. Parallelism and flatness held to close limits by rough machining prior to grinding.

5. Shank, cast as integral part of semi-steel die set, can be inserted or welded on all-steel sets.

6. Surface plates, accurate to within .0001", check flatness of ground surfaces and parallelism of die set.

To make an accurate die, an accurate die set must be used. For this reason, every Producto die set is an instrument of precision.

If planning a new die today, order your die set by the new Producto catalog — selection is easy, delivery is prompt.

THE PRODUCTO MACHINE COMPANY  
985 Housatonic Ave., Bridgeport 1, Connecticut

**For Precision Die Sets Fast Call . . . .**



ALSO MAKERS OF DIE ACCESSORIES, FEEDING EQUIPMENT, VISES, MACHINERY.

5PD52A

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—299

# OLIVER ACE

## Universal Tool and Cutter Grinders

### Are BEST for Your Toolroom

Because . . . they handle a wider range of cutters than ordinary cutter grinders — only two simple fixtures required.

The Oliver ACE requires no computation . . . its direct reading for clearances eases operators' jobs in grinding the most difficult cutters. Extremely accurate, the ACE has only one sliding part with ample bearing, efficiently protected from dust. Surpassing the usual requirements for precision, speed and economy, the Oliver ACE is especially qualified for the grinding of tungsten-carbide and high speed milling cutters and tools — jobs it tackles with amazing ease.

The proved, dependable and soundly engineered Oliver Ace Universal Tool and Cutter Grinder substantiates Oliver of Adrian's world-wide reputation of 4 decades as a designer and builder of longer lasting toolroom machinery. This truly superior type machine is simple to set up and requires only a minimum of floor space.

Along with thousands of others — Be Wise—OLIVERize Your Toolroom—NOW.



#### Direct Reading for Clearance



—Reduces Fatigue  
—Eases Operators' Jobs

Priced to meet your budget, the ACE excels for grinding face mills up to 15"—also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing and carbide tipped circular saws.

2 MODELS: Standard and Heavy Duty (illustrated)

Write Today for Complete Data

See our Catalog in Sweet's Directory

## OLIVER INSTRUMENT CO.

1410 E. MAUMEE

ADRIAN, MICHIGAN

#### MACHINE TOOLS by OLIVER include:

AUTOMATIC DRILL GRINDERS  
TOOL & CUTTER GRINDERS  
DRILL POINT THINNERS  
TEMPLATE TOOL GRINDERS  
FACE MILL GRINDERS  
DIE MAKING MACHINES

#### CHAINS, Power Transmission and Conveyor

Boston Gear Works, 3200 Main St., North Quincy, Mass.  
Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6, Ind.  
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.  
Philadelphia Gear Works, Erie Ave., and G St., Philadelphia, Pa.

#### CHISELS AND CHISEL BLANKS

Bethlehem Steel Co., Bethlehem, Pa.  
Chicago Pneumatic Tool Co., 6 E. 44th St. New York, N. Y.

#### CHUCKING MACHINES

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Goss & DeLeeuw Mch. Co. (Multiple Spindle), Kensington, Conn.  
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
National Acme Co., (Single and Multiple Spindle) 170 E. 131st St., Cleveland, Ohio.  
Potter & Johnston Co., 1027 Newport Ave., Pawtucket, R. I.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

#### CHUCKS, Air Operated

Cushman Chuck Co., Windsor Ave., Hartford 2, Conn.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Logansport Machine Co., Inc., 810 Center Ave., Logansport, Ind.  
Mead Specialties Co., 4114 North Knox Ave., Chicago 41, Ill.  
Schrader's Son, A., 470 Vanderbilt Avenue, Brooklyn, N. Y.  
Skinner Chuck Co., 344 Church St., New Britain, Conn.  
Tomkins-Johnson Co., Jackson, Mich.  
Whitton Machine Co., 190 Howard St., New London, Conn.  
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

#### CHUCKS, Collet or Split See Collets

#### CHUCKS, Diaphragm

DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Gleason Works, 1000 University Ave., Rochester, N. Y.  
Van Norman Co., 2640 Main St., Springfield 7, Mass.

#### CHUCKS, Drill

Erickson Tool Co., 2309 Hamilton, Cleveland, Ohio.  
Etco Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Jacobs Mfg. Co., West Hartford, Conn.  
McCrosky Tool Corp., 1938 Thomas St., Meadville, Pa.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Skinner Chuck Co., 344 Church St., New Britain, Conn.  
Supreme Products, Inc., 2222 So. Columet, Chicago 16, Ill.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

#### CHUCKS, Full Floating

Erickson Tool Co., 2309 Hamilton, Cleveland, Ohio.  
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y.  
Gisholt Mch. Co., Madison 10, Wis.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Universal Engineering Co., Frankenmuth 2, Mich.

(Continued on page 302)

# This is the difference High Velocity Turning makes

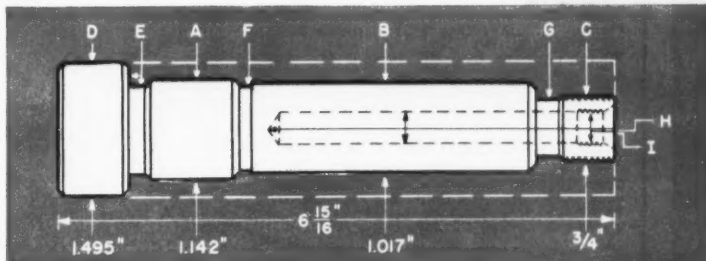


IN 1950

this job took...

**7.60 min.**

FLOOR TO FLOOR



Turn B 694 RPM — .005 Feed — Roller Turner  
 Turn C 694 RPM — .011 Feed — Square Turret  
 Turn A 694 RPM — .011 Feed — Square Turret  
 Turn D 694 RPM — .011 Feed — Square Turret  
 Form Face } E.F.G. 694 RPM — Hand — Rear of crossslide  
 Chamfer — Square Turret  
 Drill H 694 RPM — .007 Feed  
 Tap I 1/8" NPT  
 Thread C 3/4-16" Diehead  
 Cut Off 340 RPM — .0035 Feed — H.S.S.



IN 1954

this same job takes...

**5.70 min.**

FLOOR TO FLOOR

R. Turn A — 1500 RPM — .015 feed — Roller Turner  
 Turn, A.B.C.D., Chamfer — 1500 RPM — .015 Feed — Tracer Attachment  
 Face, Neck, E, F, G, — 1500 RPM — Hand — Square Turret  
 Drill H 694 RPM — .007 Feed  
 Tap I 1/8" NPT  
 Thread C 3/4-16" Diehead  
 Cut Off — 1500 RPM — .0025 Feed

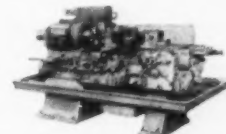
**J & L LATHES CUT COSTS AND IMPROVE QUALITY BY GIVING**  
 MORE Ease of Operation  
 MORE Power Transmission  
 MORE Rigidity  
 MORE Accurate Stops  
 MORE Efficient Lubrication  
 MORE Coolant on Cutting Tools  
 MORE Accurate Results

Turning out a medium-run job such as this in 5.70 min. calls for a lathe with plenty of power and the beef to back it up, plus the addition of another Jones & Lamson innovation — the turret lathe tracing attachment.

With this attachment, many complex machining operations can be made in a single set-up, with less down time between jobs. Only with a lathe like this can your shop take full advantage of the quality, productivity and lowered costs offered by High Velocity Turning.



Jobs like this are turned daily on our production line. Come to Springfield and see for yourself. Send for catalogs #101-A and #102.



## JONES & LAMSON

JONES & LAMSON MACHINE CO., 512 Clinton St., Dept. 710, Springfield, Vt., U.S.A.



Machine Tool Craftsmen  
 Since 1835

MACHINE TOOL DIV.

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—301

**3 ways to cut Metal**



**HAND**



**POWER**



**BANDSAWS**

**1 way to get the right Blade—**

**Call your VICTOR Distributor**

For over 50 years, industry has preferred Victor Hand, Power, and Metal and Wood Cutting Bandsaws.

Why?

Because of their consistent *quality*—the finest steels fabricated on the most modern equipment.

Because of service from local strategically located Victor Distributors—as close as your phone—who can give quick delivery from stock—who are qualified—and who have factory assistance—to help you solve your metal cutting problems.

The Victor Distributor is the place to call not only for Victor Metal Cutting Saws but also for the hundreds of other products you need regularly to keep production up and costs down.

Sold Only Through Recognized Distributors

5099

**VICTOR**

SAW WORKS, INC. • MIDDLETOWN, N. Y., U. S. A.  
Makers of Hand and Power Hacksaw Blades,  
Frames, Metal and Wood Cutting Band Saws.

#### CHUCKS, Gear

Gleason Works, 1000 University Ave., Rochester, N. Y.  
Horton Chuck, Windsor Locks, Conn.  
Supreme Products, Inc., 2222 So. Calumet, Chicago 16, Ill.

#### CHUCKS, Lathes, Etc.

Buck Tool Co., 220 Schippers La., Kalamazoo, Mich.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Cushman Chuck Co., Windsor Ave., Hartford 2, Conn.  
Erickson Tool Co., 2309 Hamilton, Cleveland, Ohio.  
Gisholt Mch. Co., Madison 10, Wis.  
Horton Chuck, Windsor Locks, Conn.  
Jacobs Mfg. Co., West Hartford, Conn.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Skinner Chuck Co., 344 Church St., New Britain, Conn.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.  
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.  
Whitton Machine Co., 190 Howard St., New London, Conn.  
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

#### CHUCKS, Magnetic

Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Hanchett Magna-Lock Corp., Big Rapids, Mich.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
Walker, O. S., Co., Inc., Worcester, Mass.

#### CHUCKS, Power Operated

Skinner Chuck Co., 344 Church St., New Britain, Conn.

#### CHUCKS, Quick Change and Safety

Erickson Tool Co., 2309 Hamilton, Cleveland, Ohio.  
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y.  
Jarvis, Charles L., Co., Middletown, Conn.  
McCrosky Tool Corp., 1938 Thomas St., Meadville, Pa.  
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.  
Procurier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Universal Engineering Co., Frankenmuth 2, Mich.

#### CHUCKS, Ring Wheel

Gardner Mch. Co., Div. Landis Tool Co., 414 E. Gardner St., Beloit, Wis.

#### CHUCKS, Tapping

DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y.  
Jacobs Mfg. Co., West Hartford, Conn.  
McCrosky Tool Corp., 1938 Thomas St., Meadville, Pa.  
Procurier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Skinner Chuck Co., 344 Church St., New Britain, Conn.

#### CIRCUIT-BREAKERS

General Electric Co., Schenectady 5, N. Y.

#### CLAMPING APPLIANCES FOR MACHINE TOOLS

Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.

#### CLAMPS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Danly Mch. Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, Ill.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Mead Specialties Co., 4114 N. Knox Ave., Chicago 41, Ill.

Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Starrett, The L. S., Co., Athol, Mass.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### CLEANERS, Chemical, for Metal

Bullard Co. Bullard-Dunn Process Div., Brewster St., Bridgeport 2, Conn.  
Oakite Products, Inc., 19 Rector St., New York N. Y.

#### CLUTCHES

Clearing Mch. Corp., 6499 W. 65th St., Chicago 38, Ill.  
Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
Formsprag Co., 23609 Hoover Rd., Van Dyke, Mich.  
Link-Belt Co., 300 West Pershing Rd., Chicago 9, Ill.  
Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y.  
Rockford Clutch Div., Borg-Warner Corp., 410 Catherine St., Rockford, Ill.  
Twin Disc Clutch Co., 1361 Racine St., Racine, Wis.

#### COLLARS, Safety

Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6, Ind.  
Standard Pressed Steel Co., Jenkintown, Pa.

#### COLLETS

Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Erickson Tool Co., 2309 Hamilton, Cleveland, Ohio.  
Gisholt Mch. Co., 1245 E. Washington Ave., Madison 10, Wis.  
Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
Hardinge Bros., Inc., 1418 College Ave., Elmira, N. Y.  
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
Pratt & Whitney, West Hartford 1, Conn.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Tomkins-Johnson Co., Jackson, Mich.  
Union Twist Drill Co., Athol, Mass.  
Universal Engrg. Co., Frankenmuth 2, Mich.  
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

#### COMPARATORS

See Gages, Comparator.

#### COMPARATORS, Optical

DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Eastman Kodak Co., Rochester, N. Y.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Jones & Lamson Mch. Co., Springfield, Vt.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

#### COMPOUNDS, Cleaning

Houghton E. F. & Co., 303 W. Lehigh Ave., Philadelphia, Pa.  
Oakite Products, Inc., 19 Rector St., New York.

#### COMPOUNDS, Cutting, Grinding, Metal Drawing, Etc.

Cities Service Oil Co., 70 Pine St., New York, N. Y.  
Houghton E. F. & Co., 303 W. Lehigh Ave., Philadelphia, Pa.  
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich. (Broaching & Lopping).  
Oakite Products, Inc., 19 Rector St., New York, N. Y.  
Shear-Speed Chem. Prod. Div., Michigan Tool Co., 7125 E. McNichols Rd., Detroit 12, Mich.  
Sinclair Refining Co., 600 Fifth Ave., New York.  
Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, Ill.  
Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St., Chicago 23, Ill.  
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.  
Texas Co., 135 E. 42nd St., New York, N. Y.

(Continued on page 304)





# H O L E S

where you want them!

Whenever your work involves punching holes in hard-to-get-at or irregularly spaced locations—there's another place where Hannifin "Hy-Power" Hydraulics can help you. This portable equipment with its variety of work tools can bring forces up to 100 tons (more in multiple) to the work as needed.

For instance . . . here a "Hy-Power" punch makes rivet holes on an accurate, easy and fast basis. Then, similar "Hy-Power" work tools take over for riveting. The Hannifin "Hy-Power" riveter cold-sets rivets to stay—quietly, at extremely low cost. This fast, finger-tip controlled operation squeezes each rivet to fill the hole completely . . . forces riveted members tightly together, work hardens the rivets . . . makes strong joints.

But "Hy-Power" Hydraulics are not limited to riveting. The basic high pressure "Hy-Power" generator and portable work tools are widely adapted for punching, forming, bending.



"Hy-Power" portable punching on furnace radiator shell.



"Hy-Power" portable riveting on an assembly operation.

## WHAT IS "HY-POWER"?

The "Hy-Power" generator—heart of the "Hy-Power" Hydraulic System—combines motor, pump, oil reservoir, control valves and high pressure intensifier into a compact, self-contained unit to power production tools.

## DESIGN ENGINEERS, TOOL SPECIALISTS

Investigate versatile "Hy-Power" equipment for your plant production operations. Write for "Hy-Power" Hydraulics Bulletin 150. Hannifin Corporation, 1109 S. Kilbourn Ave., Chicago 24, Ill.



do ALL you CAN do...with

# HANNIFIN

"Hy-Power" Hydraulics • Hydraulic Presses • Air Cylinders • Hydraulic Cylinders • Pneumatic Presses • Air Control Valves

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—303

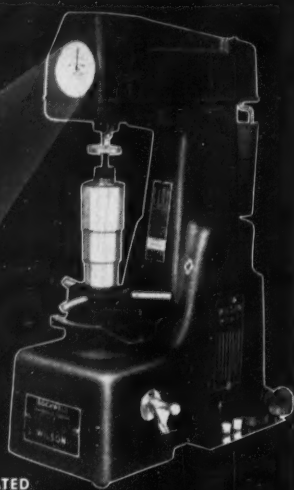


## Wilson "Rockwell"\* Hardness Testers

New Motorized  
**WILSON "ROCKWELL"\***  
Hardness Tester with  
**SET-O-MATIC\* Gauge**



Y MODEL  
MOTOR-OPERATED



### SET-O-MATIC\* DIAL GAUGE

Eliminates human error. Operator merely applies minor load and taps depressor bar. No setting of dial to zero.

#### OTHER FEATURES

- Major load applied under dash pot control
- Major load removed by motor
- Illuminated Dial Gauge
- Illuminated Penetrator

## Eliminates Operations... Increases Tests per Hour

All you have to do with the Model Y WILSON "ROCKWELL" Motorized Hardness Tester is apply the minor load and tap the major load depressor bar. The machine does everything else automatically. The cycle of Major Load operation may be less than 2 seconds.

This speed of test means great savings in time which will reduce your hardness testing costs. Yet it is done to Wilson's high standard of accuracy.

The utter simplicity of setting the SET-O-MATIC\* dial gauge eliminates human error. The operator does not have to set the dial. The large pointer is automatically brought to "SET" position when the minor load is applied.

The Model Y Motorized WILSON "ROCKWELL" Hardness Tester is in production and orders are being accepted for early delivery. Write today for descriptive literature and prices.



Wilson Mechanical Instrument Division  
**AMERICAN CHAIN & CABLE**

230-D Park Avenue, New York 17, N. Y.

\*Trade Marks



#### COMPOUNDS, Resin and Molding

General Electric Co., Schenectady 5, N. Y.

#### COMPRESSORS, Air

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Ingersoll-Rand Co., Phillipsburg, N. J.

#### CONTOUR FOLLOWER

Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Turchan Follower Machine Co., 8259 Livernois and Alaska Aves., Detroit, Mich.

#### CONTRACT WORK

Blanchard Mch. Co., 64 State St., Cambridge, Mass.  
Columbus Die-Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.  
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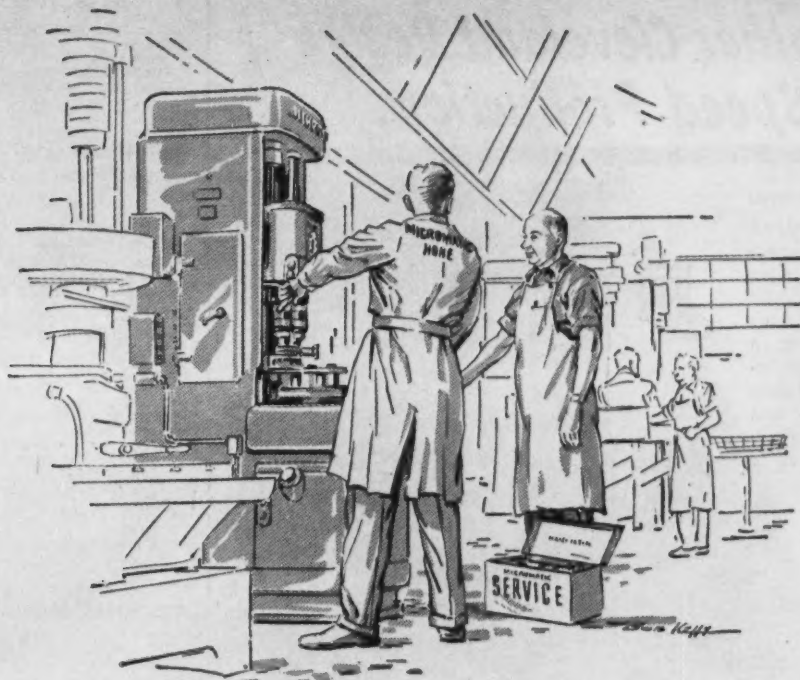
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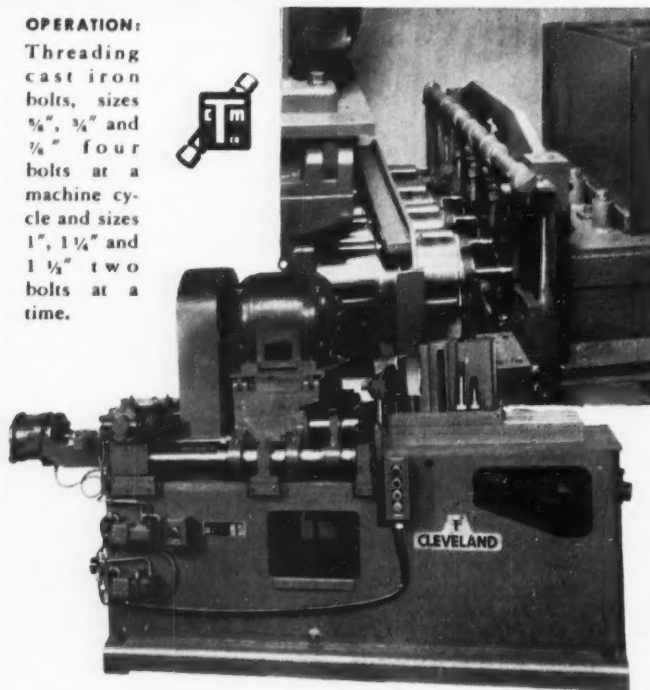
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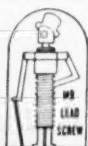
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#### Honing

Amount and rate of stock removal, formula for rotative speeds, recommended tolerances, and possible adjustments for eliminating undesirable conditions.

#### Power Brush Finishing

Characteristics and applications of brushing wheels, brushing speeds, and adjustments for eliminating undesirable conditions.

#### Materials

Nickel and nickel alloys, titanium and titanium alloys, copper-silicon and beryllium copper alloys, and revised list of chemical elements, atomic weights and melting points.

#### Tool and Die Steels

Compositions and properties affecting selection of water hardening, oil hardening, air hardening, shock resistant, hot work, and high speed tool and die steels.

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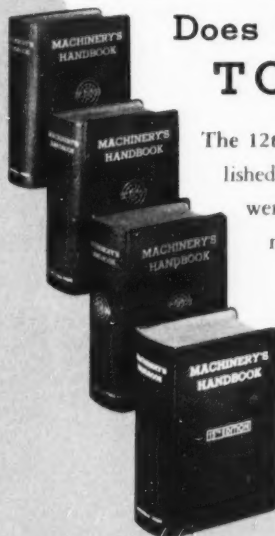
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Solution of Triangles  
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Geometrical Propositions and Problems  
Mathematical Signs, Standard Symbols and Abbreviations  
Formulas in Mechanics  
Strength of Materials

### Machine Elements

Plain Bearings  
Ball, Roller and Needle Bearings  
Keys and Keyways  
Splines  
Shafts  
Clutches and Couplings  
Friction Brake Formulas  
Springs  
Cam Design  
Spur Gearing  
Bevel Gearing  
Worm Gearing  
Helical and Herringbone Gearing  
Planetary Gearing  
Ratchet Gearing  
Belts and Pulleys  
Machine Tool Drives  
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Machine Details  
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Milling Machine Spindles and Arbors  
Cams for Threading in Automatics

### Small Tools

Taps and Threading Dies  
Milling Cutters  
Reamers  
Twist Drills, Counterbores, and Boring Bars  
Single-Point Tools and Tool Posts  
Straight and Circular Forming Tools  
Knurls  
Broaches  
Files and their Application  
Hacksaw Blades

### Metals and their Heat Treatment

Steels for Small Tools  
Stock for Screw Machine Products  
Iron and Steel Manufacture  
SAE and AISI Carbon and Alloy Steel Numbers and Compositions  
Temper of Steel Strips and Brass Sheets  
Testing the Hardness of Metals  
Iron and Steel Castings

Heat Treatment Processes for Steel  
Sub Zero Treatment of Steel  
Heat Treatment of Non-ferrous Alloys  
Brass and Bronze Alloys  
Cast and Wrought Aluminum Alloys  
Cast and Wrought Magnesium Alloys  
Nickel and Nickel Alloys  
Titanium and Titanium Alloys  
Copper-Silicon and Beryllium Copper Alloys

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Thread Milling  
Thread Grinding  
Thread Rolling  
Helical Milling  
Broaching  
Knurling  
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Speeds and Feeds for Various Metal Cutting Operations  
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Machining Plastics  
Machining Nickel Alloys  
Abrasive Cutting  
Milling Machine Indexing  
Gear Cutting

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Precision Investment Casting  
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Forge Shop Welding Methods  
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Welding with Thermit  
Electric Welding  
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Patterns  
Punches, Dies and Presswork  
Drop-forging Dies

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Polishing and Buffing  
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Chromium Plating  
Coloring Metals

### Fastening

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Self-tapping Screws  
Studs  
Nails and Spikes  
Rivets  
Screw Thread Systems  
Plain and Lock Washers  
Pipe Thread System

### Hoisting

Crane Chains, Hooks, Eyebolts, and Slings  
Shackles  
Lifting Magnets  
Wire Rope

### Measurement and Inspection

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Measuring Screw Threads  
Measuring Instruments and Gaging Methods  
Weights and Measures  
Metric System of Measurement and Conversion Tables  
Weights of Various Metal Shapes and Parts

### Allowances and Tolerances

Allowances and Tolerances for Plain Fits  
Tolerances for Sheets, Plates, Bars and Tubes  
Tolerances for Forgings  
Allowances and Tolerances for Screw Threads  
Tolerances for Thread Gages  
Tolerances for Various Machining Operations  
Tolerances for Fine-pitch Gear Blanks  
Backlash Tolerances for Gears

### Electric Motors

Standards  
Characteristics  
Applications  
Maintenance

### Other Subjects

Dimensioning and Checking Drawings  
Wire and Sheet Metal Gages  
Jigs and Fixtures  
Bearing Lubricants  
Change-Gear Ratios  
Standard Taper Pins  
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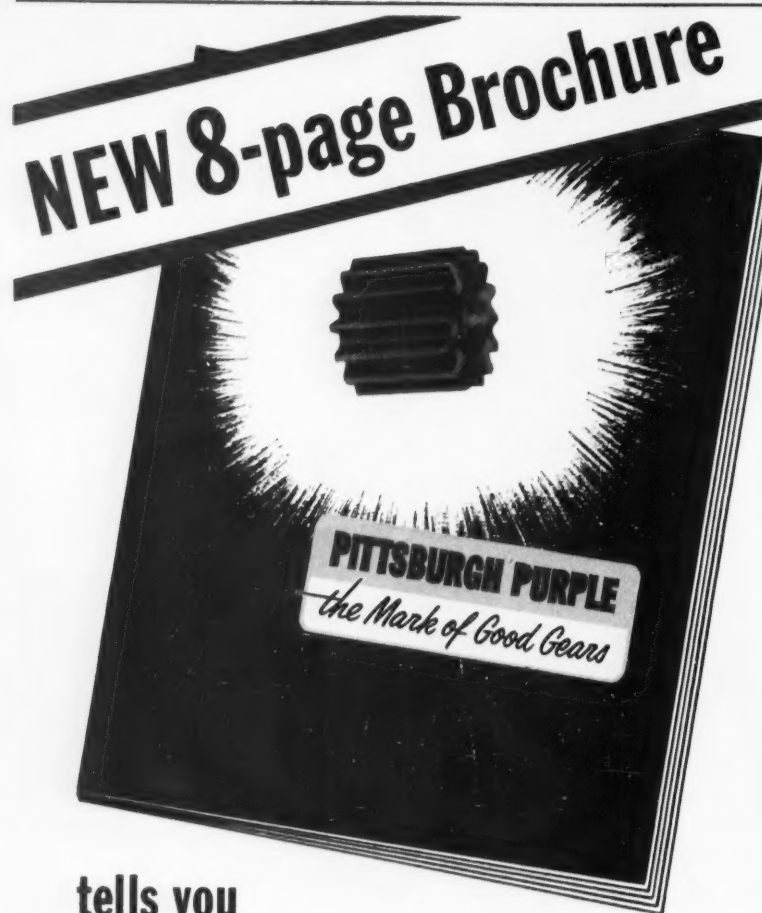
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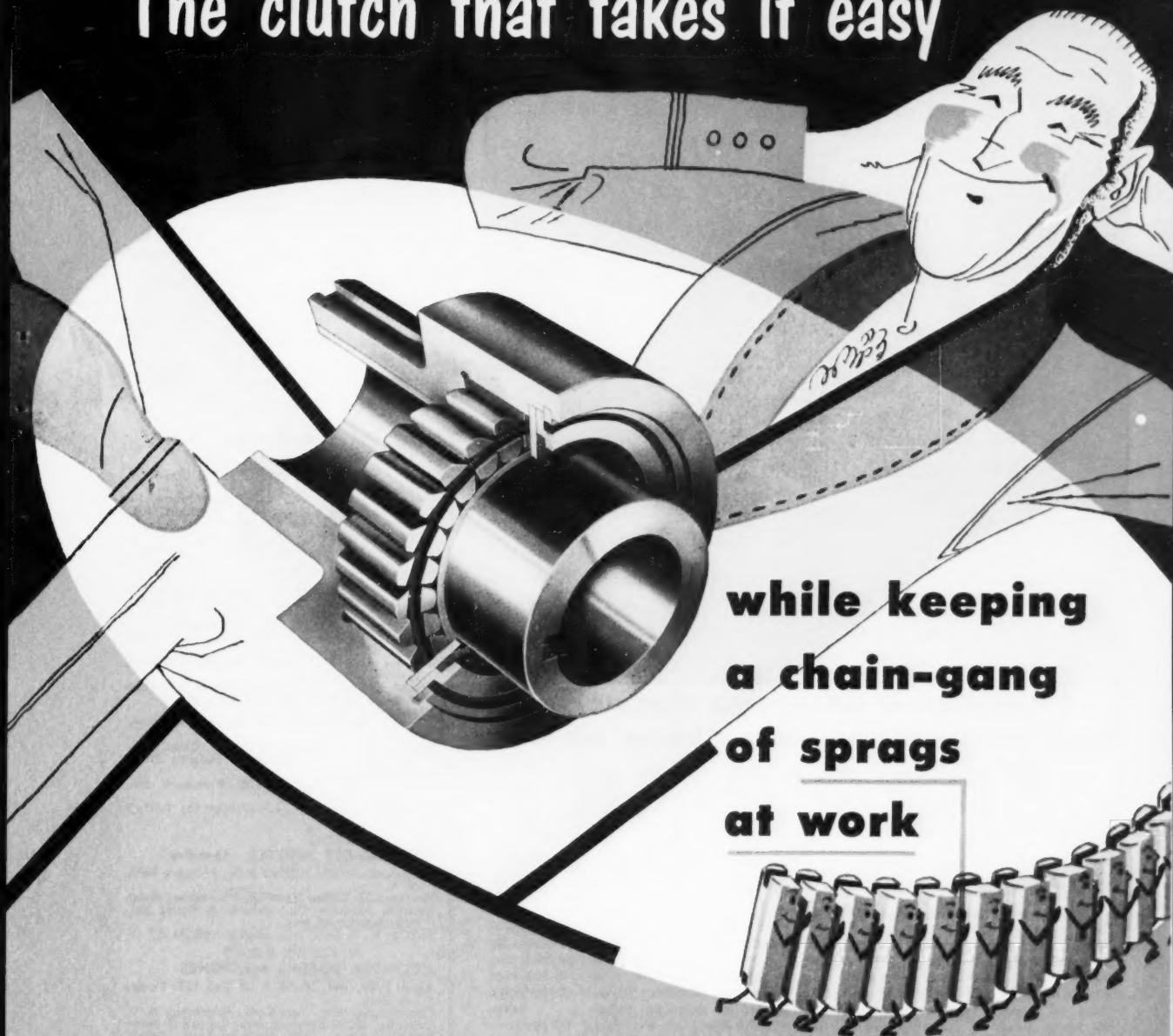
See Compounds, Cutting, Grinding, Etc.

#### CUTTING AND GRINDING FLUIDS

Cincinnati Milling Products Div., Cincinnati  
Milling Machine Co., Cincinnati, Ohio.  
Cimcool Div., Cincinnati Milling Mch. Co.,  
Cincinnati, Ohio.  
Cities Service Oil Co., 70 Pine St., New York,  
N. Y.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Houghton, E. F., & Co., 303 W. Lehigh Ave.,  
Philadelphia, Pa.  
Master Chemical Corp., 13 Huron St., Toledo 1,  
Ohio.  
Shear-Speed Chemical Products, Div. Michigan  
Tool Co., 7125 E. McNichols Rd., Detroit 12,  
Mich.  
Sinclair Refining Co., 600 Fifth Ave., New  
York.  
Standard Oil Co. (Indiana), 910 S. Michigan,  
Chicago, Ill.  
Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St.,  
Chicago 23, Ill.  
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.  
Texas Co., 135 E. 42nd St., New York, N. Y.

(Continued on page 314)

# The clutch that takes it easy



**while keeping  
a chain-gang  
of sprags  
at work**

**A FULL COMPLEMENT OF SPRAGS DOES IT . . .** Sure—you want a clutch that can do a lot of work—but you also want it to have a good, long life. Only the clutch that works *efficiently* can give you both. The Formsprag Full-Complement Clutch can take it easy while doing more work because it has more working members (sprags) than any other type of clutch. In combination with the concentric races, the sprags are

assured long life—because they have an infinite number of different race-positions at which to grip. And—the sprag's design enables it to carry a greater load than any other type of clutch member. Working as a team, the full complement of sprags share the load to provide the **MAXIMUM TORQUE CAPACITY**—in the most compact, space-saving unit—that you can select for your application.



For more interesting facts about  
Formsprag, read this folder . . .  
write for it now.

**DISTRIBUTORS IN  
PRINCIPAL CITIES**

**FORMSPRAG COMPANY**  
23609 Hoover Road, Van Dyke, Michigan

**FULL COMPLEMENT**  
**FORMSPRAG**  
*Clutches*

**OVER-RUNNING • INDEXING • BACKSTOPPING**





**PENINSULAR GRINDING WHEEL CO.**  
**saves time and labor, does a better job with**  
**FARQUHAR**  
**Hydraulic Press**

Five years ago, the Peninsular Grinding Wheel Company, Detroit, Michigan, installed a hydraulic press. Peninsular wanted a press that could mold grinding wheels quickly and well—with a minimum of rejects, that would stand up for many hours of constant use—so it chose Farquhar. And Farquhar does the job! In operation 16 hours a day, 5 days a week, this 300-ton model works smoothly and satisfactorily, cutting time and labor costs. Peninsular particularly likes Farquhar's easy pressure setting and the short ram stroke required—two of the many Farquhar features that contribute to its dependable, money-saving performance.

**Farquhar Presses Cut Your Costs**  
 Just one more example of cost-cutting

Farquhar performance in modern production. Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost.

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send for free catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: **THE OLIVER CORPORATION, A. B. Farquhar Division, Hydraulic Press Dept., 1504 Duke St., York, Pa.**



**THE OLIVER CORPORATION • A. B. FARQUHAR DIVISION**  
 314—MACHINERY, June, 1954

For more information on products advertised, use Inquiry Card, page 245

#### CUTTING-OFF MACHINES

Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Cone Automatic Mch. Co., Windsor, Vt. (Lathe Type).  
 Consolidated Mch. Tool Co., Rochester, N. Y.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 Johnson Mfg. Co., Albion, Mich.  
 Landis Machine Co., Waynesboro, Pa. (Pipe).  
 Modern Machine Tool Co., 601 S. Water St., Jackson, Mich. (Lathe Type for Tubing).

#### CUTTING-OFF MACHINES, Abrasive Wheel

Allison Co., Bridgeport, Conn.  
 Campbell Mch. Div., American Chain & Cable, 929 Conn. Ave., Bridgeport, Conn.  
 Columbia Div., Lodge & Shipley Co., Hamilton 1, Ohio.  
 Delta Power Tool Div., Rockwell Mfg. Co., 614 G. N. Lexington Ave., Pittsburgh 8, Pa.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.

#### CUTTING-OFF MACHINES, Cold Saw See Sewing Machines, Circular

#### CUTTING-OFF MACHINES, Metal Band Saws

Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago, Ill.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Famco Machine Co., 3134 Sheridan Rd., Kenosha, Wis.  
 Grob, Inc., Grafton, Wis.

#### CUTTING-OFF TOOLS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
 Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.  
 Kennametal, Inc., Latrobe, Pa.  
 Luers, J. Milton, 12 Pine St., Mt. Clemens, Mich.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
 Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

#### CUTTING-OFF WHEELS, Abrasive

Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.  
 Norton Co., 1 New Bond St., Worcester, Mass.  
 Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.  
 Smit, J. K., & Sons, Inc., Murray Hill, N. J.

#### CYLINDER BORING MACHINES

Baker Bros., Inc., Sta. F. P. O. Box 101, Toledo 10, Ohio.  
 Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 Moline Tool Co., 102 20th St., Moline, Ill.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.

#### CYLINDERS, Air

Hannafin Corp., 1101 S. Kilbourn Ave., Chicago.  
 Lehigh Foundries, Inc., 1500 Lehigh Dr., Easton, Pa.  
 Mead Specialties Co., 4114 North Knox Ave., Chicago 41, Ill.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
 Tomkins-Johnson Co., Jackson, Mich.

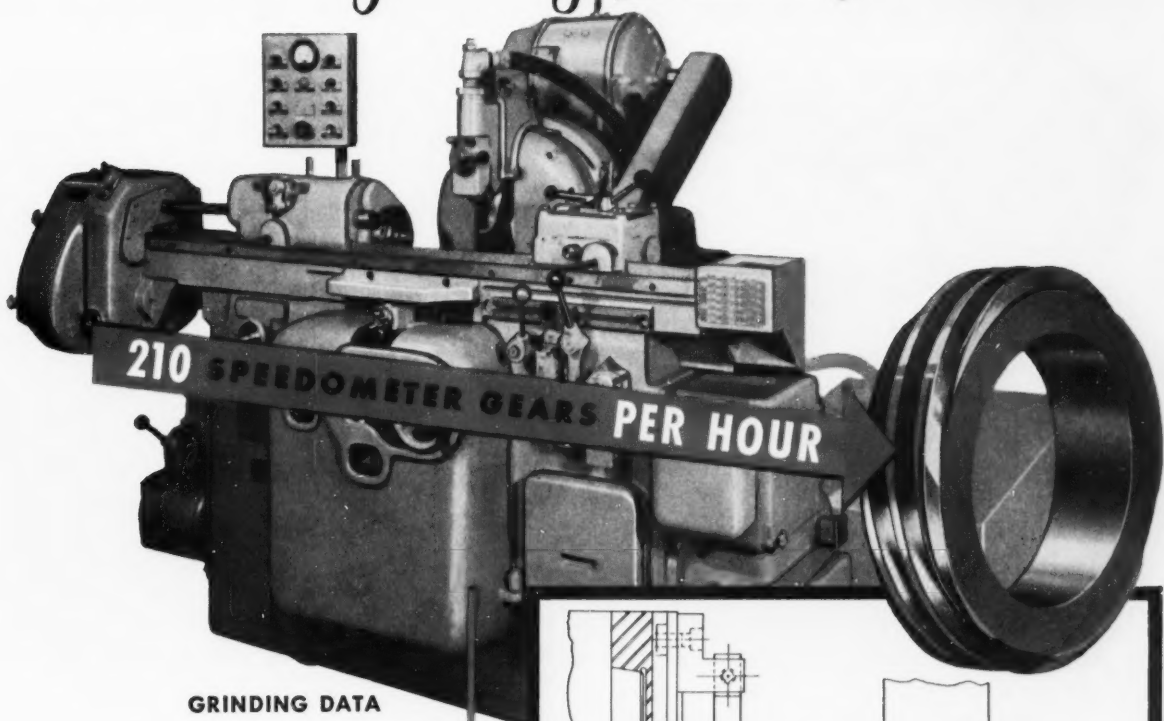
#### CYLINDERS, Hydraulic

Barnes, John S., Corp., Rockford, Ill.  
 Hannafin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Lehigh Foundries, Inc., 1500 Lehigh Dr., Easton, Pa.  
 Logansport Machine Co., Inc., 810 Center Ave., Logansport, Ind.

(Continued on page 316)



# Multi-ribbed grinding BOOSTS production!

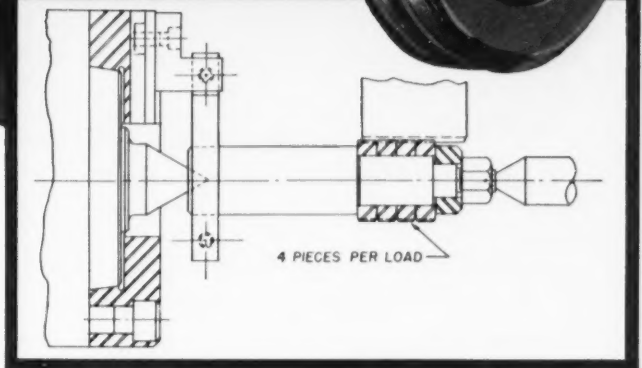


## GRINDING DATA

Diameter . . . 1.93"  
 Pitch . . . Approx. 6  
 Form . . . Worm  
 Thread . . . 4-Start  
 Lead . . . .6797"  
 Helix Angle . . . 6° 37'  
 Thread Length . . . 1 7/8"  
 One way grinding  
 Stock removed . . . .089"  
 Crush Dressing of Wheel

## AUTOMATIC WORK CYCLE

Automatic In Feed  
 Automatic Sizing  
 Automatic Wheel Truing  
 Automatic Lubrication  
 Automatic Coolant System

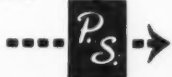


These four-start worms are ground — four at a time in a single pass — from the solid. A multi-ribbed wheel is crush-dressed every 48 pieces (twelve arbor loads). The finish on these parts — and the rate of production — exceed those possible by any other methods.

This is a typical example of how the FULLY AUTOMATIC WORK CYCLE of Jones & Lamson Automatic Grinders assures rapid metal removal, accuracy of form and quality of finish.

Because of today's challenge for increased production at a higher degree of accuracy, Automatic thread and Form Grinders are replacing other methods for producing this class of work.

On the basis of increased quality and *more production per labor hour*, we invite the opportunity to improve upon your existing methods.



# JONES & LAMSON

JONES & LAMSON MACHINE CO., 512 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

For more information on products advertised, use Inquiry Card, page 245



*Machine Tool Craftsmen  
 Since 1835*

MACHINE TOOL DIV.

MACHINERY, June, 1954—315

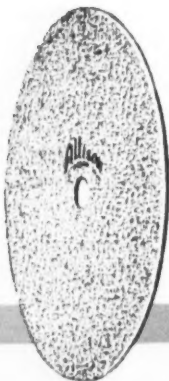
## No need to hold back any longer...



# Titanium

## IS RARIN' TO GO!

... and the cutting of Titanium is no longer a problem, either. Allison abrasive cutting wheels can speed your company on its way to finding new uses for this wonder metal. Tests prove that abrasive cutting is the only efficient and economical method for cutting Titanium, as well as many of the tough "new" high-temperature resistant alloys.



The cutting of Titanium with Allison abrasive wheels is comparable in speed, quality and economy with that of cutting most grades of steel.

Tough Cut-Off Jobs Are Easy ... with Allison.

YOURS, TOO, CAN BE ROUTINE.

The best way to cut many materials ...  
the only way to cut some.

**Allison**  
ABRASIVE CUTTING WHEELS

THE ALLISON CO., 265 ISLAND BROOK AVENUE, BRIDGEPORT 8, CONN.

316—MACHINERY, June, 1954

National Forge & Ordnance Co., Irvine, Warren County, Pa.  
Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Rockford Machine Tool Co., 2500 Kiskadee St., Rockford, Ill.  
Tomkins-Johnson Co., Jackson, Mich.

### DEALERS, Machinery

Botwinik Bros. of Mass., Inc., 14 Sherman St., Worcester, Mass.  
Mach & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.  
Ryerson, Jas. T. & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.

### DEMAGNETIZERS

Blanchard Mch. Co., 64 State St., Cambridge, Mass.  
Heald Mch. Co., 10 New Bond St., Worcester 6, Mass.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Taft-Pierce Mfg. Co., Woonsocket, R. I.  
Walker, O. S., Inc., Worcester, Mass.

### DESIGNERS, Machine and Tool

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Hartford Specialty Mchry. Co., 287 Homestead St., Hartford, Conn.  
Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

### DIAMONDS AND DIAMOND TOOLS

Smit, J. K., & Sons, Inc., Murray Hill, N. J.

### DIE-CASTING

See Castings, Die

### DIE-CASTING MACHINES

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.  
Lake Erie Engineering Corp., Kenmore Station, Buffalo, N. Y.

### DIE CUSHIONS

Bliss, E. W. Co., 1375 Raff Rd., S. W. Canton, Ohio.  
Clearing Mch. Corp., 6499 W. 65th St., Chicago, Ill.  
Verson Allsteel Press Co., 93rd St. and S Kenwood Ave., Chicago, Ill.

### DIE INSERTS, Carbide

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex Detroit 32, Mich.  
Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Kernametal Inc., Latrobe, Pa.  
Metal Carbides Corp., Youngstown, Ohio.  
Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

### DIEMAKERS' SUPPLIES

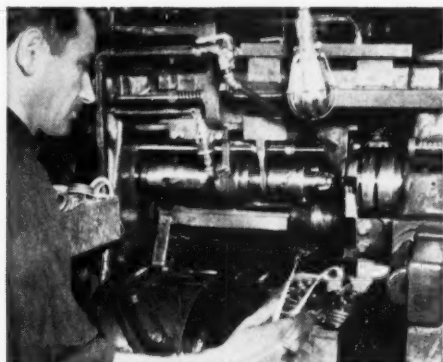
Allied Products Corp., 12677 Burt Rd., Detroit 23, Mich.  
Bliss, E. W. Co., 1375 Raff Rd., S. W. Canton, Ohio.  
Dorly Mch. Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, Ill.  
Producta Mch. Co., 990 Housatonic Ave., Bridgeport, Conn.  
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

### DIEMAKING MACHINES

Grob, Inc., Grafton, Wis.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Oliver Instrument Co., 1410 E. Moume St., Adrian, Mich.

(Continued on page 318)

# FREE-MACHINING ENDURO STAINLESS STEEL BARS



***Put parts in the pan 90% as  
fast as Bessemer screw stock***

You can give duplicate parts the high physical and chemical properties of stainless steel. And, you can do it without a heavy production penalty!

Simply set up and run Free-Machining ENDURO Stainless Steel Bars. They'll respond beautifully at every station on your automatics. Two grades are fully 90% as machinable as Bessemer screw stock.

These high-quality bars are cold-finished by Republic's Union Drawn

Steel Division. They provide close tolerance, accuracy of section, uniform soundness, and fine surface finish.

Free-Machining ENDURO also is available in hot-rolled bars and in wire. Republic metallurgists and machining advisers are ready to help you apply ENDURO every step of the way. Just write:

**REPUBLIC STEEL CORPORATION**  
Alloy Steel Division • Massillon, Ohio  
GENERAL OFFICES • CLEVELAND 1, OHIO  
Export Department: Chrysler Building, New York 17, N. Y.

**NEW!** 96-page pocket size booklet, "How To Machine Republic ENDURO Stainless Steel Bars." Packed with machining tips, tables of feeds and speeds, stainless steel properties, other vital information. Write Republic. Ask for ADV-607. **FREE!**

**REPUBLIC ENDURO**

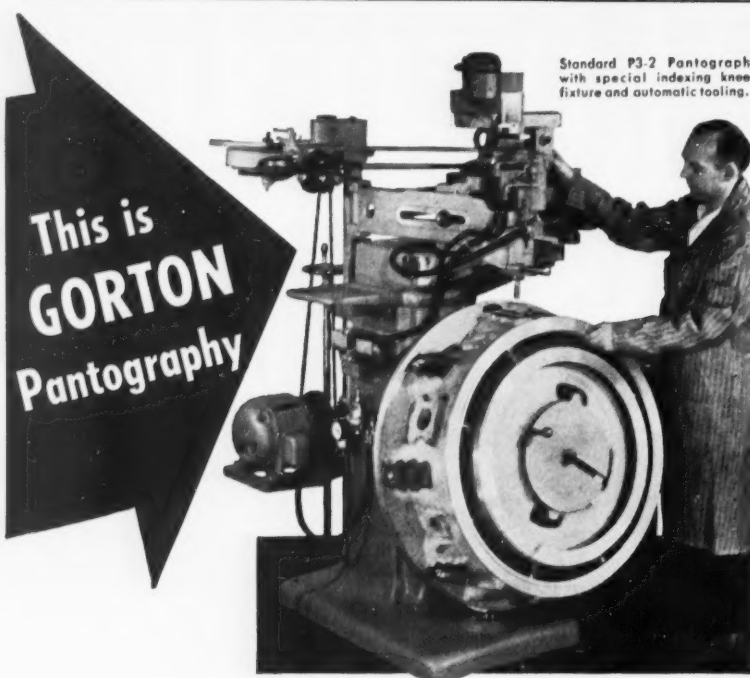
**FREE-MACHINING STAINLESS STEEL**



Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Bars, Wire, Pig Iron, Steel and Plastic Pipe, Bolts and Nuts, Tubing

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—317



Standard P3-2 Pantograph with special indexing knee fixture and automatic tooling.

## ...Ready to Help You

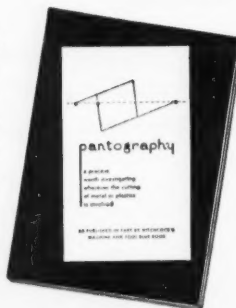
Photo shows a standard P3-2 profiling ports in an aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic. A combination of other methods would do the cutting in hours, but the P3-2, with an automatic cutting cycle, finishes each port in 2.3 minutes.

## Improve Production and Lower Costs

Gorton tracer-controlled equipment does efficient profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving and many other standard or special operations. You can expect high accuracy and high surface finish, whether your work involves metals or plastics in flat, uniformly curved, cylindrical or irregular shapes.

Enlarged templates, masters or patterns, all quickly and easily made, give Gorton Pantographs advantages of increased accuracy through reduction ratios. Work pieces range in size from the diameter of a dime to 10 feet. Cutting cycle is accomplished manually or automatically.

Fill out and mail the coupon for your copies of the Gorton catalog and the informative booklet, "Pantography."



**GEORGE  
GORTON  
MACHINE CO.**



Please send at once complete information about the Gorton line contained in Bulletin 1655-1306.

Firm .....

Name .....

Title .....

Address .....

City, State .....

1306 Racine St., Racine, Wis., U.S.A.

A 7786-3/5

318—MACHINERY, June, 1954

For more information on products advertised, use Inquiry Card, page 245

### DIE SETS, Standard

Bliss, E. W. Co., 1375 Raff Rd., S. W. Canton, Ohio.  
Danly Mch. Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, Ill.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Producto Mch. Co., 990 Hausatonic Ave., Bridgeport, Conn.  
U. S. Tool Co., Inc., 255 N. 18th St., Ampere, N. J.  
Wales-Strippit Corp., N. Tonawanda, N. Y.

### DIE-SINKING MACHINES

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Cincinnati Milling Mch. Co., Cincinnati, Ohio.  
Gorton, George, Machine Co., 1110 W. 13th St., Racine, Wis.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.

### DIE-SINKING PRESSES

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
Kearney & Trecker Corp., Milwaukee, Wis.

### DIE STOCKS

See Stocks, Die

### DIES, Sheet Metal, Etc.

Allied Products Corp., 12677 Burt Rd., Detroit 23, Mich.  
Bliss, E. W. Co., 1375 Raff Rd., S. W. Canton, Ohio.  
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Columbus Die-Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.  
Dreis & Krupp Mfg. Co., 7416 Loomis Blvd., Chicago 36, Ill.  
Ferracute Mch. Co., Bridgeton, N. J.  
John B., Manufacturing Co., Ellis St., New Britain, Conn.  
Metal Carbides Corp., Youngstown, Ohio.  
Niagara Mch. & Tool Wks., 683 Northland Ave., Buffalo, N. Y.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Taff-Pearce Mfg. Co., Woonsocket, R. I.  
Verson Alsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, Ill.  
Wales-Strippit Corp., N. Tonawanda, N. Y.  
Waltham Mch. Wks., Newton St., Waltham, Mass.  
Winzeler Mfg. & Tool Co., 1712 West Arcade Pl., Chicago 12, Ill.

### DIES, Threading

Butterfield Div., Union Twist Drill Co., Derby Line, Vt.  
Card, S. W., Mfg. Co., Mansfield, Mass.  
Detroit Tap & Tool Co., 8615 E. 8 Mile Rd., Base Line, Mich.  
Eastern Mch. Screw Corp., New Haven, Conn.  
Geometric Tool Co., Westville Station, New Haven 15, Conn.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
Pratt & Whitney, West Hartford 1, Conn.  
Reed Rolled Thread Die Co., P. O. Box 350, Worcester 1, Mass.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Winter Bros. Co., Rochester, Mich.

### DIES, Threading, Opening

Eastern Mch. Screw Corp., New Haven, Conn.  
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y.  
Geometric Tool Co., Westville Station, New Haven 45, Conn.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
Landis Mch. Co., Waynesboro, Pa.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.

### DIES, Thread Rolling

Detroit Tap & Tool Co., 8615 E. 8 Mile Rd., Base Line, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Reed Rolled Thread Die Co., P. O. Box 350, Worcester 1, Mass.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.

(Continued on page 320)



# National Tool Co.



Years of successful experience in special tooling and related production problems are yours for the asking. When the job requires special cutting tools call in your National Tool Co. representative. He is backed by more than 49 years experience in the engineering and manufacture of special cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

**National**  
**TOOL CO.**

Cleveland 2, Ohio

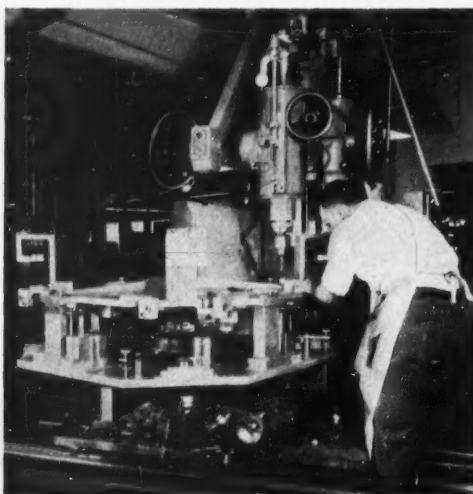
# TOUGH PROJECTS OR PRECISION PRODUCTION CALLS FOR CONTRACT JIG BORING BY **B. Jahn**

**BATTERIES OF THE LATEST JIG BORERS MANNED BY  
MASTER TOOLMAKERS MAINTAIN YOUR SPECIFICATIONS**

**... SCHEDULES**

**... SATISFACTION!**

Jig boring a huge  
radar housing fix-  
ture. Over 200 indi-  
vidual holes were  
held to ten-thou-  
sandths tolerances.



In the large B. Jahn plant, 16 modern jig borers — in every size — are at the service of industry.

B. Jahn engineering superiority is continuously overcoming seemingly insurmountable jig boring obstacles. Whether it be a single fixture or a production run — a simple task or a real production headache — investigate B. Jahn contract jig boring and the dividends of time saved, money saved it can pay you.

DESIGN AND CONSTRUCTION OF DIES • TOOLS • JIGS • FIXTURES • GAGES • SPECIAL MACHINERY • JIG GRINDING • JIG BORING • KELLER DUPLICATING



**FACILITY LIST AND LITER-  
ATURE SENT ON REQUEST.  
QUOTATIONS HANDLED  
PROMPTLY.**

## **B. Jahn**

**B. JAHN MANUFACTURING COMPANY NEW BRITAIN, CONNECTICUT**

320—MACHINERY, June, 1954

### **DISCS, Abrasives**

Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.  
Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.  
Norton Co., 1 New Bond St., Worcester, Mass.  
Simonds Abrasive Co., Tacony and Fraley Sts., Bridesburg, Philadelphia, Pa.  
Smit, J. K. & Sons, Inc., Murray Hill, N. J.  
Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

### **DISINTEGRATORS**

Elox Corp., 602 N. Rochester Rd., Clawson, Mich.

### **DIVIDING HEADS**

See Indexing and Spacing Equipment

### **DOWELL PINS**

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn.  
Danly Mch. Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, Ill.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn.  
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

### **DRAFTING MACHINES**

Universal Drafting Mch. Corp., 7960 Lorain Ave., Cleveland, Ohio.

### **DRESSERS, Grinding Wheel**

Carboloy Dept., General Electric Co., Box 237 Roosevelt Park Annex, Detroit 32, Mich.  
Colonial Broach Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Erickson Tool Co., 2309 Hamilton, Cleveland, Ohio.  
El-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Hoagland Engrg. & Mfg. Co., Inc., Berkeley Heights, N. J.  
Metal Carbides Corp., Youngstown, Ohio.  
Meyers, W. F. Co., Bedford, Ind.  
Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.  
Norton Co., 1 New Bond St., Worcester, Mass.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.  
Vince Corp., 9113 Schaefer Hwy., Detroit 28, Mich.

### **DRIFTS, DRILL**

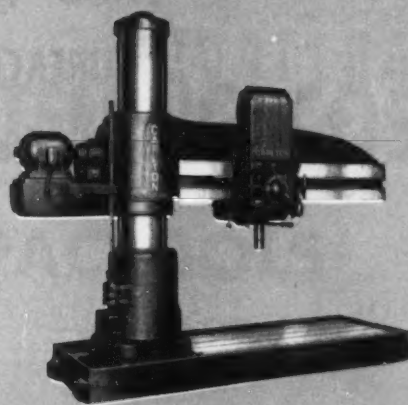
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago, Ill.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

### **DRILL HEADS, Multiple Spindle**

Baker Bros., Inc., Station F, P.O. Box 101, Toledo 10, Ohio.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Buhr Mch. Tool Co., 835 Green St., Ann Arbor, Mich.  
Cansedy-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y.  
Ettco Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Maline Tool Co., 102 20th St., Maline, Ill.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Thriftmaster Products Corp., 1076 N. Plum St., Lancaster, Pa.  
United States Drill Head Co., 616 Burns, Cincinnati, Ohio.  
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

(Continued on page 322)

Only  
**one**  
can be  
called  
"the  
finest"



**CARLTON is "the One"**

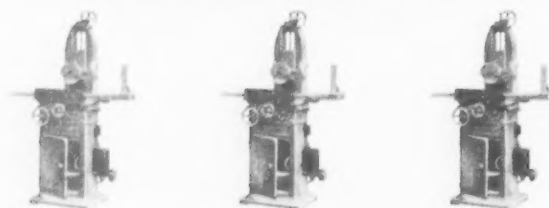
Why? For many reasons: automatic positioning of arm, hardened wear strips, counterbalanced spring for compensating for heavier tools, built-in light in head, push-button control, precision power clamping of column, arm and head, automatic lubrication. These and the many other Carlton advantages explain Carlton's top performance. You're sure to find your most economical size here, too, because the Carlton line includes arm lengths from 3-ft. to 12-ft., column diameters from 9" to 26". Write today for descriptive literature. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

**Carlton**  
*radial drills*



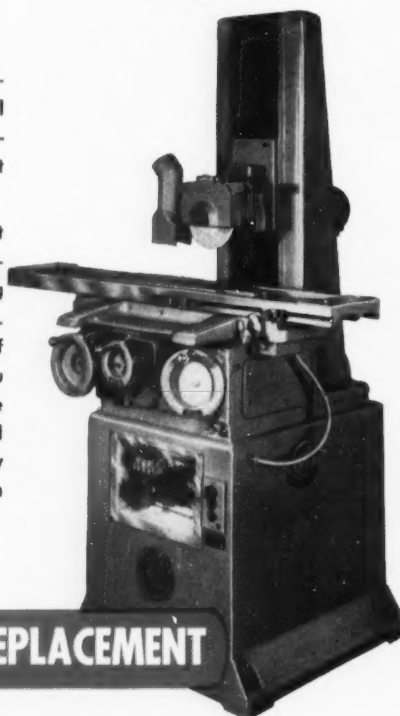
# ANTIQUE SURFACE GRINDERS

will keep you in the **RED**



Operating over-age surface grinders in your toolroom — the focal point of all quality production — deals a punishing blow to plant costs and efficiency.

Recent surveys show that one out of every five machines now in operation is incapable of meeting today's precision tooling demands. If your plant is still using one of these antiques, it's time for you to talk with your Reid dealer. He will show you how modern Reid Grinders will increase accuracy and efficiency in your toolroom production.



**PLAN NOW FOR REPLACEMENT**

with **REID GRINDERS**

For complete information on Reid Surface Grinders, write today for Catalog 618-2.

see our catalog in

**MACHINE  
TOOL  
CATALOGS**

or write for copy

Model 618V  
illustrated



## DRILL HEADS, Unit Type

Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Keller Tool Co., Grand Haven, Mich.  
Kingsbury Mch. Tool Corp., Keene, N. H.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
Rehner-Jacobson Mfg. Co., 2135 Kishwaukee St., Rockford, Ill.  
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.

## DRILL SOCKETS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

## DRILL STANDS

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati 4, Ohio.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

## DRILLING MACHINES, Automatic

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Baker Bros. Inc., Station F, P.O. Box 101, Toledo 10, Ohio.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.  
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.  
Bodine Corp., Mt. Grove St., Bridgeport, Conn.  
Buhr Mch. Tool Co., 835 Green St., Ann Arbor, Mich.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Kingsbury Mch. Tool Corp., Keene, N. H.  
Millholland, W. K., Machinery Co., 6402 Westfield Blvd., Indianapolis 5, Ind.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
National Automatic Tool Co., Inc., S. 7th and N. Sts., Richmond, Ind.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.  
Wales-Strippit Corp., N. Tonawanda, N. Y.  
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

## DRILLING MACHINES, Bench

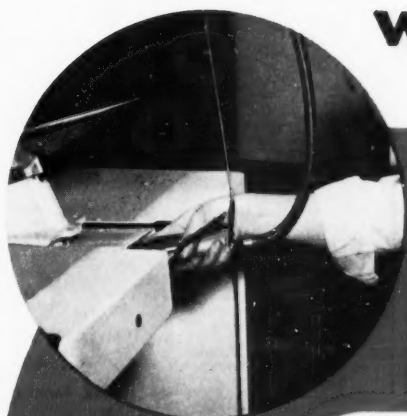
Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Boice-Crane, 941 W. Central Ave., Toledo, Ohio.  
Buffalo Forge Co., 490 Broadway, Buffalo.  
Canedy-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Edlund Machinery Co., Cortland, N. Y.  
Famco Machine Co., 3134 Sheridan Rd., Kenosha, Wis.  
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.  
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Walker-Turner Div., Kearney & Trecker Corp., 900 North Ave., Plainfield, N. J.

## DRILLING MACHINES, BOILER

Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.  
Foote-Burt Co., 1300 St. Clair Ave., Cleveland.  
(Continued on page 324)



# How AIRengineering can REDUCE YOUR FASTENING COSTS with IMPACTTOOLS



from the smallest

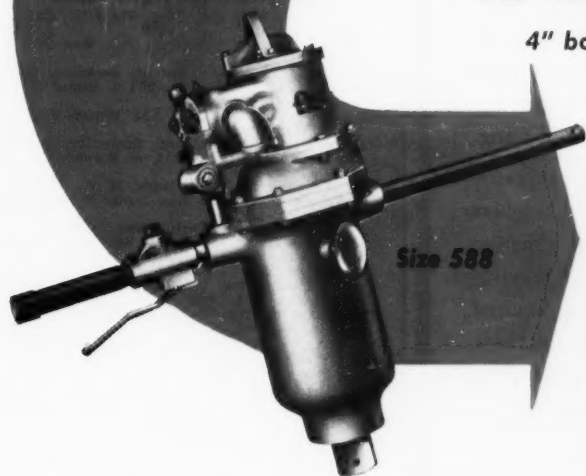
7/32" bolt capacity



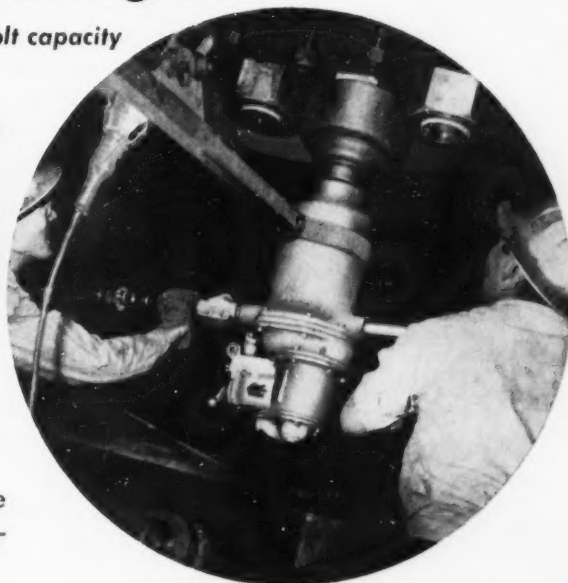
Size 500B

to the largest . . .

4" bolt capacity



Size 508



I-R Impacttools can save you up to 90% of the time required to perform nut running and bolting-up operations by hand methods.

Whether your operation calls for tightening or loosening nuts on tiny fraction-of-an-inch bolts or larger bolts up to four inches thread size, there's an I-R Impacttool to do the job faster and easier—and cut your fastening costs.

Call in an Ingersoll-Rand AIRengineer. He'll recommend the right I-R Impacttools for your fastening operations. I-R Impacttools—actually pay for themselves in days.

## Ingersoll-Rand

8-37

11 Broadway, New York 4, N. Y.

### AIRengineering . . .

*the modern way to faster production*



**UP  
PRODUCTION  
1000%**

**ELIMINATE  
METAL WASTE!**

All the sensational savings and short cuts of contour machining and file finishing *now* within the reach of *any* shop.

## BOICE-CRANE 14" CONTOUR SAW BAND FILERS AS LOW AS \$399.50!

With extreme precision and continuous cutting with no back-stroke, a Boice-Crane slices away hard alloys and carbon steels in one-tenth the time required by slow milling, drilling, shaping and hand filing.

Produce maintenance parts, production parts, metal templates, special wrenches, wrench templates, cams, spiral parts, irregular shaped stacked parts and stamping, forming and trimming dies in minutes instead of hours. File broaching and flash removal in 1/9 the time required by hand and 1/4 the time required by reciprocating filing machine. Eight speeds 92 to 4100 blade f.p.m. for cutting, filing, abrasive grinding.

Performs all the operations that machines costing \$1800.00 will do, yet prices begin at less than \$400.00.

Choose a  
**Boice-Crane**  
the  
better  
**14" Band Saw**  
that also  
**files!**



### BOICE-CRANE COMPANY

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Please send free literature on the Boice-Crane  
( ) Contour Saw-Band Filer-Belt Grinder;  
( ) Full-line Catalog of Power Tools.

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STREET .....  
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#### DRILLING MACHINES, Deep Hole

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.  
National Automatic Tool Co., Inc., 5. 7th and N. Sts., Richmond, Ind.  
Pratt & Whitney, West Hartford 1, Conn.  
Wales-Strippit Corp., N. Tonawanda, N. Y.

#### DRILLING MACHINES, Gang

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Baker Bros., Inc., Station F, P.O. Box 101, Toledo 10, Ohio.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.  
Cincinnati Bickford Tool Co., 3220 Farrer Ave., Cincinnati, Ohio.  
Cleereman Mch. Tool Co., Green Bay, Wis.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Edlund Machinery Co., Cortland, N. Y.  
Foote-Burt Co., 1300 St. Clair Ave., Cleveland.  
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.  
Millholland, W. K. Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind.  
Moline Tool Co., 102 20th St., Moline, Ill.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
National Automatic Tool Co., Inc., 5. 7th and N. Sts., Richmond, Ind.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.

#### DRILLING MACHINES, Horiz. Duplex

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Baker Bros., Inc., Station F, P.O. Box 101, Toledo 10, Ohio.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.  
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.  
Edlund Machinery Co., Cortland, N. Y.  
Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.  
Kingsbury Mch. Tool Corp., Keene, N. H.  
Millholland, W. K. Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind.  
Moline Tool Co., 102 20th St., Moline, Ill.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
National Automatic Tool Co., Inc., 5. 7th and N. Sts., Richmond, Ind.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

#### DRILLING MACHINES, Horizontal Portable

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Cincinnati Bickford Tool Co., 3220 Farrer Ave., Cincinnati, Ohio.

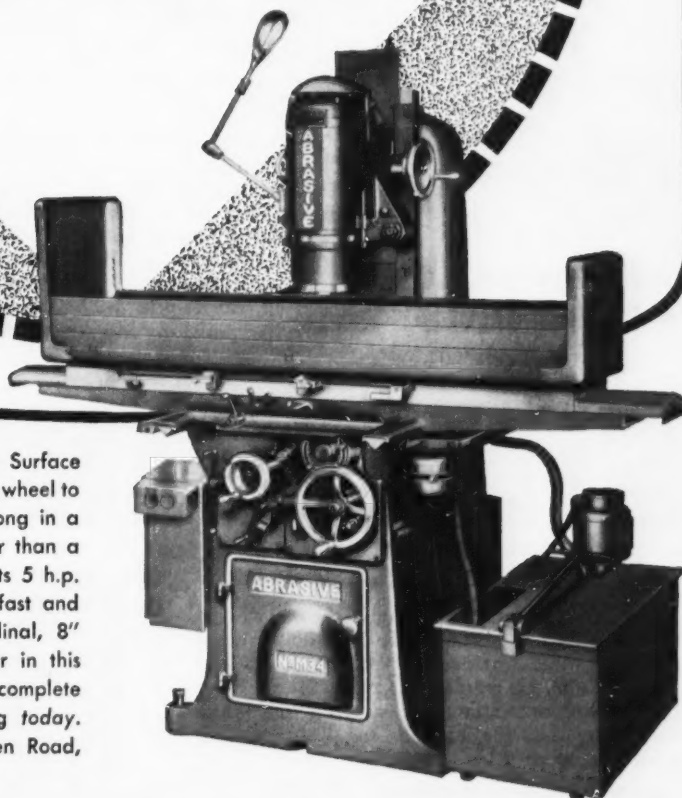
#### DRILLING MACHINES, Inverted

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Baker Bros., Inc., Station F, P.O. 101, Toledo 10, Ohio.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
National Automatic Tool Co., Inc., 5. 7th and N. Sts., Richmond, Ind.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.

(Continued on page 326)

# Grind Flat Surfaces

# FAST



The Abrasive No. M34 Vertical Spindle Surface Grinder puts the face of a 6" segmental grinding wheel to work — grinds pieces up to 4" wide by 24" long in a single pass. This grinder is up to 400% faster than a comparable horizontal spindle machine . . . its 5 h.p. motorized spindle brings parts down to size fast and economically. Work capacity is 24" longitudinal, 8" transverse, 12" vertical . . . the only grinder in this capacity range with a vertical spindle. For complete details, write for Abrasive No. M34 Catalog today. Abrasive Machine Tool Company, 12 Dunellen Road, East Providence 14, Rhode Island.

**ABRASIVE**

ACCURACY BOOSTS PRODUCTION

*Abrasive Quality Is Reflected in the Finish of Your Product*

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—325

# FOR

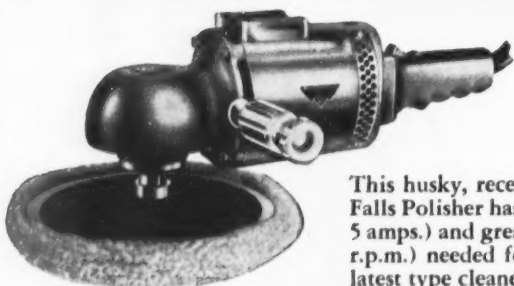
New,  
light-weight,  
heavy-duty  
No. 404



## MILLERS FALLS GRINDERS

Latest addition to Millers Falls famous line of portable electric grinders, the No. 404 weighs only 9¼ lbs., yet has a 5.5 amp. rating. It uses 4" diameter wheels up to 1" wide and is designed for continuous heavy-duty service such as snagging castings, grinding welds, grinding off rivets, etc. Other models up to 6" with speed ranges from 3700 r.p.m. to 5500 r.p.m.

# FASTER



## MILLERS FALLS POLISHERS

High-speed,  
high-powered  
No. 270

This husky, recently-introduced Millers Falls Polisher has the extra power (a full 5 amps.) and greater spindle speed (1900 r.p.m.) needed for best results with the latest type cleaners and polishes that are proving so popular. It's light, compact, pleasant to use — and it's supplied with a deep, carpet-pile wool pad, the most effective polishing head ever developed.

# FINISHING

## MILLERS FALLS SANDERS

A beautifully engineered 7" unit, the 870 weighs only 7½ lbs., but carries a full 5.5 amp. rating and can handle continuous operation. Its no-load speed of 4500 r.p.m. makes it perfect for driving the new laminated phenolic grinding wheels and discs as well as for fast sanding. Other models available up to 9".



*The Mark of Superiority*

Light,  
high-power  
No. 870

FREE — Write for literature on Millers Falls wide line of portable electric grinders, polishers, sanders, drills, saws, screw drivers and other high-performance tools. Demonstrations gladly arranged on request.

MILLERS FALLS COMPANY, Dept. M-2, Greenfield, Mass.



## DRILLING MACHINES, Multiple Center Column Type

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
National Automatic Tool Co., Inc., 5. 7th and N. Sts., Richmond, Ind.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.

## DRILLING MACHINES, Multiple Spindle

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Baker Bros., Inc., Station F, P.O. Box 101, Toledo 10, Ohio.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.  
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.  
Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34, Cal.  
Candey-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.  
Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.  
Cleerman Mch. Tool Co., Green Bay, Wis.  
Cosa Corp., 405 Lexington Ave., New York 17.  
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Edlund Machinery Co., Cortland, N. Y.  
Famco Machine Co., 3134 Sheridan Rd., Kenosha, Wis.  
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.  
Greenlee Bros. & Co., 12th and Columbia Ave., Rockford, Ill.  
Hartford Special Mchry, Co., 287 Homestead St., Hartford, Conn.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kingsbury Mch. Tool Corp., Keene, N. H.  
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.  
Millholland, W. K., Mchry, Co., 6402 Westfield Blvd., Indianapolis 5, Ind.  
Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.  
Moline Tool Co., 102 20th St., Moline, Ill.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
National Automatic Tool Co., Inc., 5. 7th and N. Sts., Richmond, Ind.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.  
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

## DRILLING MACHINES, Radial

American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio.  
Candey-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.  
Carlton Mch. Tool Co., 3000 Spring Grove Ave., Cincinnati 25, Ohio.  
Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.  
Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Foote-Burt Co., 1300 St. Clair Ave., Cleveland, Ohio.  
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.  
Kaukauna Machine Corp., Kaukauna, Wis.  
Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.  
Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.

## DRILLING MACHINES, Rail See Drilling Machines, Gang

## DRILLING MACHINES, Sensitive

Avey Drilling Mch. Co., 26 E. Third St., Covington, Ky.  
Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.

(Continued on page 328)

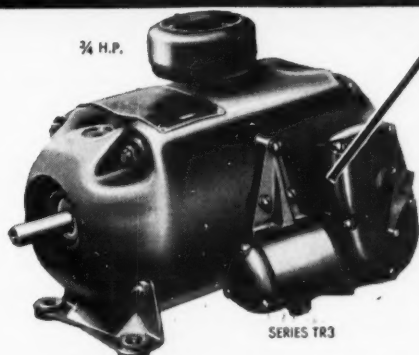


# 18% PRODUCTION INCREASE

## Maintenance Practically Eliminated



Winding TV power transformer coils at Sparton Radio-Television



# VICKERS®

VARIABLE SPEED

## Hydraulic Transmission

Hourly production was increased 18% when these coil-winding machines at Sparton Radio-Television were equipped with the Series TR3 Vickers Variable Speed Hydraulic Transmission. This improvement resulted from the superior control features inherent in the transmission: (1) extremely quick and smooth variations in speed, (2) maximum torque at low rpm, (3) instantaneous starting and stopping.

While the previous drives required maintenance approximately once a week, the Vickers transmissions have needed attention only three or four times since they were installed four years ago. They have built-in automatic overload protection and they are automatically pressure lubricated by the power-transmitting medium (oil).

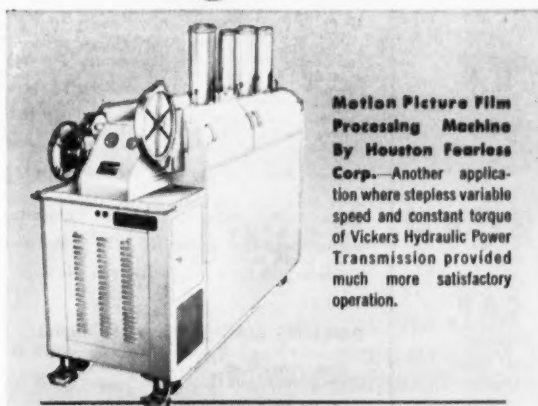
Perhaps you have an application where this Vickers Variable Speed Hydraulic Transmission will make similar improvements and economies. Ask the nearest office listed below for Bulletin 47-40a.

### VICKERS Incorporated

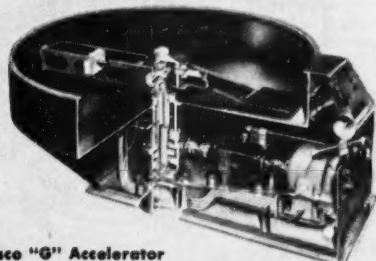
DIVISION OF THE SPERRY CORPORATION

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**Motion Picture Film Processing Machine By Houston Fearless Corp.**—Another application where stepless variable speed and constant torque of Vickers Hydraulic Power Transmission provided much more satisfactory operation.



#### Genisco "G" Accelerator

A rugged, low cost unit used to calibrate accelerometers and other equipment under operational acceleration forces. Speed settings must be accurate and precisely maintained over extended operating periods. Driven by Vickers Variable Speed Hydraulic Transmission.

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—327

# 18% BIGGER BARREL



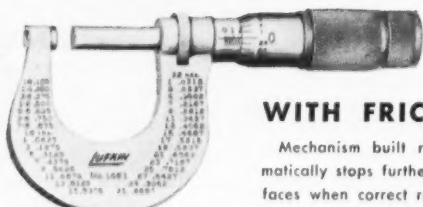
**Gives Faster, Easier**

**More Accurate Measurements**

There's more space between graduations making it easier to estimate fractions of thousandths. There are longer graduation lines and the rapid reading figures marking each thousandth are larger. Non-glare Chrome-Clad satin finish on the barrel gives you easy reading even in poor light. Lufkin micrometers are easiest to adjust, too — the reading line keeps its original position directly in line of vision and the thimble doesn't cover measurements on the hub.



## New **LUFKIN** BIG BARREL MICROMETERS



### WITH FRICTION THIMBLE

Mechanism built right into the thimble automatically stops further pressure on the measuring faces when correct reading is obtained.



### WITH RATCHET CAP

A Lufkin exclusive! With the ratchet completely enclosed in the cap you can still take "one hand" measurements.

### A Complete New Line To Exactly Fit Your Needs

In the new Lufkin Big Barrel Micrometers you have a choice of Friction Thimble, Ratchet Cap or Direct Feel only. You can have the exclusive new Lufkin Slip-Proof black crackle finish on the frame or Chrome-Clad satin finish. You can have any style with or without lock-nut. You can have carbide tipped anvil and spindle. The new Lufkin shorter design gives you better balance and the extended anvil and tapered frame permit you to take measurements in places inaccessible to other micrometers. You'll like the new Lufkin Big Barrel Micrometers — try the one of your choice today.

BUY **LUFKIN** TAPES • RULES • PRECISION TOOLS  
FROM YOUR DISTRIBUTOR

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132-138 Lafayette St., New York City • Barrie Ont.

Canedy-Otto Div., Cincinnati Lathe & Tool Co.,  
Oakley, Cincinnati, Ohio.  
Cosa Corp., 405 Lexington Ave., New York 17,  
N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co.,  
614G N. Lexington Ave., Pittsburgh 8, Pa.  
Edlund Machinery Co., Cortland, N. Y.  
Famco Machine Co., 3134 Sheridan Rd., Ken-  
osha, Wis.  
Foote-Burt Co., 1300 St. Clair Ave., Cleveland,  
8, Ohio.  
Fosdick Mch. Tool Co., 1638 Blue Rock, Cin-  
cinnati 23, Ohio.  
Leland-Gifford Co., 1025 Southbridge St., Wor-  
cester, Mass.  
National Automatic Tool Co., Inc., S. 7th and  
N. Sts., Richmond, Ind.  
Pratt & Whitney, West Hartford 1, Conn.  
Ryerson, Jos. T. & Son, Inc., 2558 W. 16th St.,  
Chicago 18, Ill.  
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
South Bend Lathe Works, Inc., 425 E. Madison  
St., South Bend, Ind.  
Wales-Strippit Corp., N. Tonawanda, N. Y.

### DRILLING MACHINES, Upright

Avey Drilling Mch. Co., 26 E. Third St., Cov-  
ington, Ky.  
Baker Bros., Inc., Station F, P.O. Box 101,  
Toledo 10, Ohio.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Barnes, W. F. & John, Co., 201 S. Water St.,  
Rockford, Ill.  
Baush Mch. Tool Co., 156 Wason Ave., Spring-  
field 7, Mass.  
Boice-Crane, 941 W. Central Ave., Toledo,  
Ohio.  
Buffalo Forge Co., 490 Broadway, Buffalo,  
N. Y.  
Canedy-Otto Div., Cincinnati Lathe & Tool Co.,  
Oakley, Cincinnati, Ohio.  
Cincinnati Bickford Tool Co., 3220 Forrer Ave.,  
Cincinnati, Ohio.  
Cleereman Mch. Tool Co., Green Bay, Wis.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Cosa Corp., 405 Lexington Ave., New York 17,  
N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co.,  
614G N. Lexington Ave., Pittsburgh 8, Pa.  
Edlund Machinery Co., Cortland, N. Y.  
Foote-Burt Co., 1300 St. Clair Ave., Cleveland  
8, Ohio.  
Fosdick Mch. Tool Co., 1638 Blue Rock, Cin-  
cinnati 23, Ohio.  
Hartford Special Mchry. Co., 287 Homestead  
St., Hartford, Conn.  
Ingersoll Milling Mch. Co., 2442 Douglas St.,  
Rockford, Ill.  
Leland-Gifford Co., 1025 Southbridge St., Wor-  
cester, Mass.  
Moline Tool Co., 102 20th St., Moline, Ill.  
National Automatic Tool Co., Inc., S. 7th and  
N. Sts., Richmond, Ind.  
Orban Kurt Co., Inc., 205 East 42nd St., New  
York 17, N. Y.  
Peerless Production Corp., 19449 Glendale  
Ave., Detroit 23, Mich.  
Rehnberg-Jacobson Mfg. Co., 2135 Kishwaukee  
St., Rockford, Ill.  
Ryerson, Jos. T. & Son, Inc., 2558 W. 16th St.,  
Chicago 18, Ill.  
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette,  
Detroit 7, Mich.  
South Bend Lathe Works, Inc., 425 E. Madison  
St., South Bend, Ind.  
Wales-Strippit Corp., N. Tonawanda, N. Y.

### DRILLING MACHINES, Wall, Radial

Cleveland Punch & Shear Works Co., 3917 St.  
Clair Ave., N. E., Cleveland, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.

### DRILLS, Center

Chicago-Latrobe Twist Drill Works, 411 W.  
Ontario St., Chicago, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St.,  
Cleveland, Ohio.  
Gorham Tool Co., 14400 Woodrow Wilson,  
Detroit, Mich.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Keo Cutters, 19326 Woodward, Detroit, Mich.  
National Twist Drill & Tool Co., Rochester,  
Mich.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

### DRILLS, Core

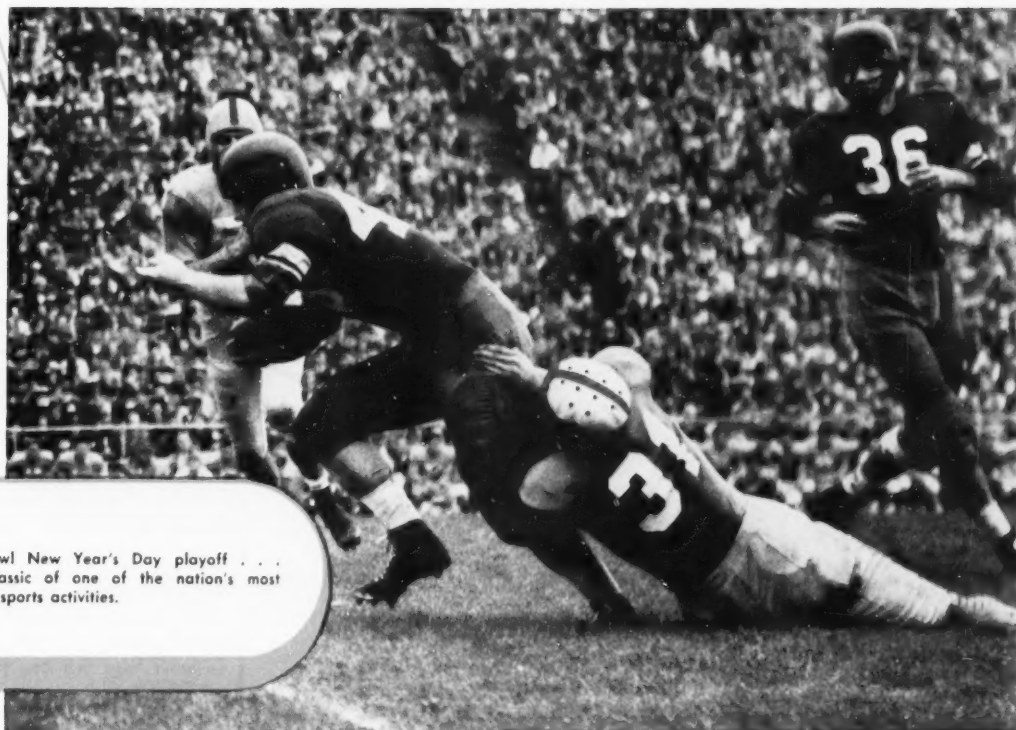
Carboloy Dept., General Electric Co., Box 237,  
Roosevelt Park Annex, Detroit 32, Mich.  
Chicago-Latrobe Twist Drill Works, 411 W.  
Ontario St., Chicago, Ill.  
Erickson Tool Co., 2309 Hamilton, Cleveland,  
Ohio.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit  
32, Mich.

(Continued on page 330)

# LOGAN

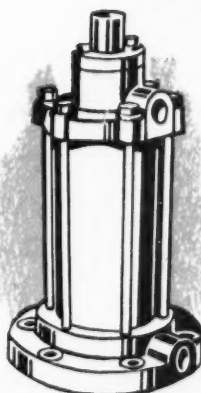
... a national participant in major  
fluid power advancements

SINCE 1916



Rose Bowl New Year's Day playoff . . .  
great classic of one of the nation's most  
popular sports activities.

## LOGAN HYDRAULIC CYLINDERS



### 750 SERIES NONROTATING TYPE 7 STANDARD MOUNTINGS

Eight standard sizes from 2" to 8"  
diameter bore. Maximum operating  
pressure 750 p.s.i.

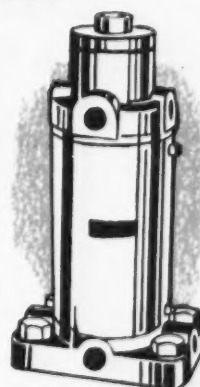
### ROTATING "HR" TYPE

Seven standard sizes from 3" to 14"  
diameter bore. Maximum operating  
pressure 500 p.s.i.

### ROTOCAST® SERIES 7 STANDARD MOUNTINGS

Sizes from 2" to 8" bore; any length  
stroke up to 8 feet as standard. Four  
piston rod end types. Operating  
pressures to 1500 p.s.i.

*Consult Logan for your special  
heavy-duty, mill-type cylinder  
requirements*



LOGAN MANUFACTURES 6,975 STANDARD CATALOGED ITEMS  
FREE CATALOG ON REQUEST

AIR CONTROL VALVES, Cat. 100-4 - AIR CHUCKS, Cat. 70-1 - AIR CYLINDERS, Cat. 100-1 - AIR-HYDRAULIC CYLINDERS, Cat. 100-3  
AIR and HYDRAULIC PRESSES, Cat. 51 - COLLET GRIP TUBE FITTINGS, Cat. 200-5 - HYDRAULIC CONTROL VALVES, Cat. 200-4  
HYDRAULIC CYLINDERS, Cats. 200-2; 200-3 - HYDRAULIC POWER UNITS, Cat. 200-1 - SURE-FLOW COOLANT PUMPS, Cat. 62



LOGANSPORT MACHINE CO., INC., 810 CENTER AVE., LOGANSPORT, IND.

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—329





## JOHNSON BEARINGS

Industry that's going places gets its bearings from Johnson. That's

natural, too. Johnson Bronze is known around the world as Sleeve Bearing Headquarters. Industry can get any type of sleeve bearing, any bearing metal, any size . . . here. And men who know bearing values realize that Johnson Bearings stand for economy in first cost, in application and in performance.

**JOHNSON BRONZE COMPANY**  
520 South Mill Street, New Castle, Pa.



**JOHNSON BEARINGS**  
*Sleeve Type*



Firth Sterling, Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Gairing Tool Co., 21225 Hoover Rd., Detroit 32, Mich.  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.  
McCoskey Tool Corp., 1938 Thomas St., Meadville, Pa.  
National Twist Drill & Tool Co., Rochester, Mich.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Smit, J. K., & Sons, Inc., Murray Hill, N. J.  
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.  
Union Twist Drill Co., Athol, Mass.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.  
Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

### DRILLS, Deep Hole

Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Smit, J. K., & Sons, Inc., Murray Hill, N. J.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

### DRILLS, Portable Electric

Black & Decker Mfg. Co., Towson, Md.  
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Millers Falls Co., Greenfield, Mass.  
Ryersson Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.

### DRILLS, Portable Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Keller Tool Co., Grand Haven, Mich.  
Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.

### DRILLS, Ratchet

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

### DRILLS, Twist

Besley-Welles Corp., Beloit, Wis.  
Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

### DRILLS, Wire

Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago, Ill.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

### DRIVES, Chain

Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6, Ind.

(Continued on page 332)





**one is always best**

*...and **REX** is the standard  
by which all high speed  
steels are compared*

No matter how keen the competition, there can be only one winner. And the difference between the winner and the runner-up, whether it's golf or making high speed steels, is measured in performance.

Crucible REX® high speed steels have proved their championship qualities under the toughest sort of competition — in actual use in thousands of tool shops throughout the world. But check for yourself. Try a piece of REX high speed steel on your next job. Compare its hardenability, response to heat treatment, its fine tool performance. You won't find another high speed steel to outperform REX.

Ask for REX by name wherever high speed steels are sold. But remember, REX is made *only* by Crucible.



**CRUCIBLE**

first name in special purpose steels

54 years of *Fine* steelmaking

**TOOL STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—331

**DUPLICATORS**

Gorton, George, Mch. Co., 1110 W. 13th St.,  
Racine, Wis.  
Lehigh Foundries, Inc., 1500 Lehigh Dr.,  
Easton, Pa.  
Pratt & Whitney, West Hartford 1, Conn.  
Richford Mch. Tool Co., 2500 Kishwaukee St.,  
Rockford, Ill.

**DUST COLLECTORS**

Delta Power Tool Div., Rockwell Mfg. Co.,  
614G N. Lexington Ave., Pittsburgh 8, Pa.  
Kindt-Collins Co., 12653 Elmwood Ave., Cleve-  
land 11, Ohio.  
Pangborn Corp., Hagerstown, Md.

**DUST CONTROL SYSTEMS**

Pangborn Corp., Hagerstown, Md.

**ELECTRICAL EQUIPMENT**

General Electric Co., Schenectady 5, N. Y.

**EMERY WHEEL DRESSERS**

See Dressers, Grinding Wheel

**EMERY WHEELS**

See Grinding Wheels

**ENGRAVING MACHINES**

Cosa Corp., 405 Lexington Ave., New York 17,  
N. Y.  
Gorton Geo., Mch. Co., 1110 W. 13th St.,  
Racine, Wis.

**EXTRACTORS, Screw**

Cleveland Twist Drill Co., 1242 E. 49th St.,  
Cleveland, Ohio.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

**FACING MACHINES**

Baird Machine Co., 1700 Stratford Ave., Strat-  
ford, Conn.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit  
32, Mich.  
National Automatic Tool Co., Inc., S. 7th and  
N Sts., Richmond, Ind.

**FANS, Exhaust, Electric Ventilating**

Buffalo Forge Co., 490 Broadway, Buffalo,  
N. Y.  
General Electric Co., Schenectady 5, N. Y.

**FEEDS FOR PRESSES, Automatic**

Federal Press Co., 600 Division and Big Four  
R. R. Elkhart, Ind.  
U. S. Tool Co., Inc., 255 North 18th St.,  
Ampere, N. J.

**FELT, For All Applications**

American Felt Co., Glenville, Conn.

**FILES, Hack**

DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Simonds Saw & Steel Co., 470 Main St., Fitch-  
burg, Mass.

**FILES, Hand**

DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Heller Bros. Co., Newcomerstown, Ohio.  
Nicholson File Co., 23 Acorn St., Providence,  
R. I.  
Simonds Saw & Steel Co., 470 Main St., Fitch-  
burg, Mass.

**FILES, Machine**

DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Oliver Instrument Co., 1410 E. Maumee St.,  
Adrian, Mich.

**FILES AND BURS, Rotary**

Atrax Co., Newington, Conn.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Jarvis, Chas. L., Co., Middletown, Conn.  
Pratt & Whitney, West Hartford 1, Conn.  
Wesson Co., 1220 Woodward Heights Blvd.,  
Ferndale, Mich.

**FILING MACHINES, Dies, Etc.**

Boice-Crane, 941 W. Central Ave., Toledo,  
Ohio.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Grob, Inc., Grafton, Wis.  
Hirschmann Co., Carl, 30 Park Ave., Man-  
hasset, N. Y.  
Jarvis, Chas. L., Co., Middletown, Conn.  
Oliver Instrument Co., 1410 E. Maumee St.,  
Adrian, Mich.

**FILTERS, Air**

Keller Tool Co., Grand Haven, Mich.

**FILTERS, Coolant and Oil**

Barnes Drill Co., 814 Chestnut St., Rockford  
Ill.  
Cuno Engrg. Corp., Meridan, Conn.  
Industrial Filtration Co. (Delpark Corp.) 15  
Industrial Ave., Lebanon, Ind.

**FINISHES FOR MACHINES AND METAL PARTS**

Lowe Bros. Co., Dayton, Ohio.

**FLEXIBLE COUPLINGS**

See Couplings, Flexible

**FLEXIBLE SHAFT EQUIPMENT**

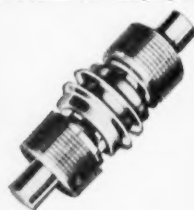
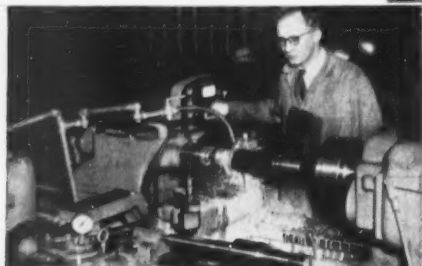
Jarvis Chas. L., Co., Middletown, Conn.  
Orban, Kurt, Co., Inc., 205 East 42nd St.,  
New York 17, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Walker-Turner Div., Kearney & Trecker Corp.,  
900 North Ave., Plainfield, N. J.

**FORGINGS, (Upsetting) Machines**

Ajax Mfg. Co., Euclid, Cleveland 17, Ohio.  
Baldwin-Lima-Hamilton Corp., Philadelphia 42,  
Pa.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2,  
Ohio.  
National Machinery Co., Greenfield and Stan-  
ton Sts., Tiffin, Ohio.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New  
York 17, N. Y.

(Continued on page 334)

# HOW TO GET THE RIGHT CLUTCH



Whatever your power transmission control require-  
ments may be, your product will benefit by using a  
clutch that is exactly suited to its need. Thousands  
of manufacturers — in hundreds of industries — have  
increased the efficiency of their machines with the  
right ROCKFORD CLUTCHES. Our engineers are  
not restricted to any one type or size of clutch —  
but are free to specify one that is best suited to the  
particular operating essentials of your product.



Write for our latest bulletin that  
shows typical installations of  
ROCKFORD CLUTCHES and  
POWER TAKE-OFFS, with dia-  
grams of unique applications,  
capacity tables, dimensions and  
specifications.

**ROCKFORD CLUTCH DIVISION**

BORG-WARNER

410 Catherine Street, Rockford, Illinois

# ROCKFORD CLUTCHES

*for Precision*

**+ Low Cost:**

# MIKRON

## GEAR HOBBER #79

**Mikron Hobbing Machines Excel  
Where High Precision Machining  
Standards Must Be Maintained**



• **MIKRON No. 79** is an excellent choice for small spur gears and pinions. It is simple to operate, to set-up and to change-over from job to job. **CAPACITY:** Gears, max. dia.  $1\frac{1}{16}$ " ; max. length of cut  $1\frac{1}{8}$ " ; number of teeth 6 to 390; pitch DP 26 and finer.



## **RUSSELL, HOLBROOK & HENDERSON, INC.**

**292 Madison Avenue, New York 17, N. Y.**

**FORGINGS, Drop**

Bethlehem Steel Co., Bethlehem, Pa.  
Mueller Brass Co., Port Huron 35, Mich.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**FORGINGS, Hollow Bored**

Bethlehem Steel Co., Bethlehem, Pa.  
National Forge & Ordnance Co., Irvine, Warren County, Pa.

**FORGINGS, Iron and Steel**

Bethlehem Steel Co., Bethlehem, Pa.  
Cameron Iron Works, Inc., 1000 Silber Rd., Houston, Texas.  
Morgan Engrg. Co., Alliance, Ohio.  
National Forge & Ordnance Co., Irvine, Warren County, Pa.

**FORGINGS, Upset**

Bethlehem Steel Co., Bethlehem, Pa.  
Mueller Brass Co., Port Huron 35, Mich.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**FORMING AND BENDING MACHINES**

American Steel Foundries, Elmes Engrg. Div., Paddock Rd., and Tennessee Ave., Cincinnati, Ohio.  
Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, Ill.  
Ferracute Machine Co., Bridgeton, N. J.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
Yoder Co., 5500 Walworth, Cleveland, Ohio.

**FORMING AND STAMPING MACHINES**

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.  
Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, Ill.  
Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

**FORMING TOOLS or Tool Blanks**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.  
Kennametal, Inc., Latrobe, Pa.  
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

**FRAMES, Machinery Welded**

Mahon, R. H. Co., Detroit 34, Mich.

**FURNACES, Heat-Treating**

General Electric Co., Schenectady 5, N. Y.

**FURNITURE, Shop**

Standard Pressed Steel Co., Jenkintown, Pa.

**GAGE BLOCKS**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Pratt & Whitney, West Hartford 1, Conn.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass.

**GAGES, Air**

Cosa Corp., 405 Lexington Ave., New York 17.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Federal Products Corp., P. O. Box 1027, Providence, R. I.  
Pratt & Whitney, West Hartford 1, Conn.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.

**GAGES, Comparator**

Alina Corp., 401 Broadway, New York 13, N. Y.  
Amco Gage Co., 19760 W. 8 Mile Rd., Detroit 19, Mich.  
Ames, B. C. Co., Waltham 54, Mass.  
Baptist Machine Co., Inc., 36 Ludlow St., Stamford, Conn.  
Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio.  
Comtar Co., 47 Farwell St., Waltham 54, Mass.  
Cosa Corp., 405 Lexington Ave., New York 17.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Federal Products Corp., P. O. Box 1027, Providence, R. I.  
Hanson-Whitney Co., Div. Whitney Chain Co., Hartford, Conn.  
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
Pratt & Whitney, West Hartford 1, Conn.  
Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Standard Gage Co., Inc., Poughkeepsie, N. Y.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.

**GAGES, Depth**

Ames, B. C. Co., (Dial), Waltham 54, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Federal Products Corp., P. O. Box 1027, Providence, R. I.

(Continued on page 336)

**AMERICAN SCREW COMPANY**

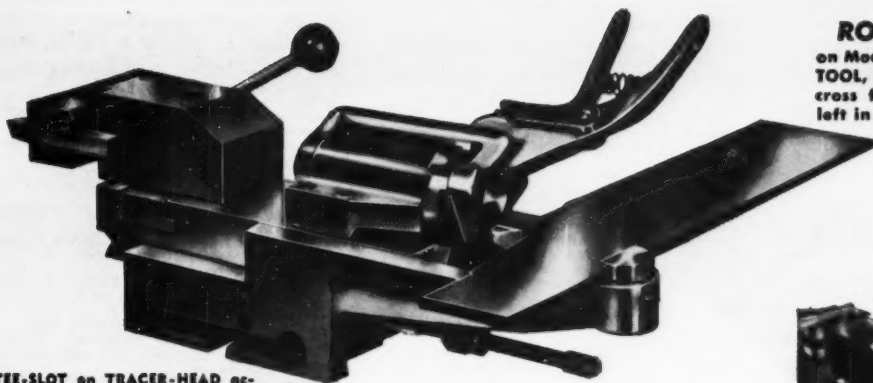
comes to **HARTFORD Special**

for **HIGH PRODUCTION THREAD ROLLING MACHINES**

If you roll threads now or plan to, you'll want to know more about "The Best Buy in the Long Run". Write for bulletin.

**THE HARTFORD SPECIAL MACHINERY CO. HARTFORD 12, CONN.**



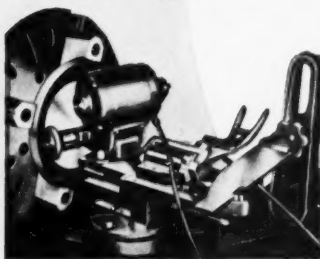


**TEE-SLOT on TRACER-HEAD** accommodates standard or quick change tool holders, square turners, planer clapper box, grinding attachments, boring bars, etc.



#### **BULLARD OPERATIONS**

— including outside and inside tracing. Tracer-head adapts to ram.



#### **CONTOUR GRINDING**

— including internal and external contours.

**JUST OUT—New Catalog**  
**Lehigh SOLENOID VALVES**  
**For complete AUTOMATION**  
mailed on request

AIR CONTROL DIVISION OF

**Lehigh Foundries, Inc.**

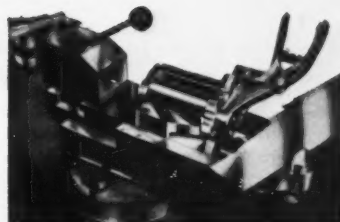
1507 LEHIGH DRIVE, EASTON, PA.

West Coast Distributor: CAMPBELL CONTOUR ATTACHMENT COMPANY, 1320 W. Esther St., Long Beach, Calif.

MGNS OF AIR VALVES • AIR CYLINDERS • AIR HOISTS • AIR MOTORS • PRECISION CASTINGS • AUTOMATIC VENDING MACHINES • COMMERCIAL REFRIGERATION SYSTEMS & UNITS

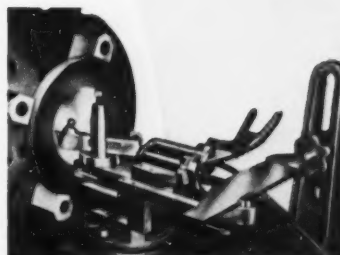
#### **ROTARY STYLUS—**

on Model M-1500 Lehigh TRACER-TOOL, illustrated at left, permits cross feed screw to be set and left in one position while successive pieces are machined or cuts are made. Speeds production. Assures accuracy even on old worn lathes.



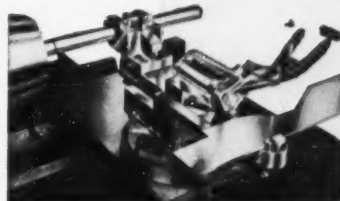
#### **O.D. CONTOUR TURNING**

— and tapering. Unlimited radii.



#### **CONTOUR FACING**

— or any engine or turret lathe.



#### **I.D. BORING**

— consisting of various blended radii as well as 90° steps.

## **Faster—lower cost LATHE DUPLICATING WITH ANY ENGINE OR TURRET LATHE**

- No complicated electronic or hydraulic controls.
- Quickly set up without making permanent alterations to the lathe. Does not tie up costly capital equipment.
- Gives complete working visibility and chip clearance.
- Positive stylus contact assured by air pressure to tool through a 3-way valve and pressure regulator. Uses shop pressure.
- Horizontal slide on Tracer Head operates between pre-loaded ball bearings. Precision built.
- Uses easily made, low cost, hardened templates.
- Proved in hundreds of shops of all sizes and in scores of major manufacturing and service industries for short and production runs.

#### **MODELS NOW AVAILABLE**

EL-1100 to fit lathes 9"-14".....Price \$375

M-1500 to fit lathes 16"-24".....Price \$725

EL-2000 to fit lathes 24" & larger.....Price \$975

Prices subject to change without notice • Tool holder and template not included • Air valve and regulator supplied only with Models M-1500 and EL-2000.

#### **ENGINEERING SERVICE**

Our engineering department will be glad to advise you on any duplicating problem. Catalog and engineering bulletins on request.



Hanson-Whitney Co., Div., Whitney Chain Co., Hartford, Conn.  
 Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
 Millers Falls Co., Greenfield, Mass.  
 Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Standard Gage Co., Inc., Poughkeepsie, N. Y.  
 Starrett, The L. S. Co., Athol, Mass.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.

**GAGES, Dial**

Ames, B. C., Co., Waltham 54, Mass.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Federal Products Corp., P. O. Box 1027, Providence, R. I.  
 Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
 Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Standard Gage Co., Inc., Poughkeepsie, N. Y.  
 Starrett, The L. S. Co., Athol, Mass.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.

**GAGES, Electric**

Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio.  
 Cosa Corp., 405 Lexington Ave., New York 17.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Federal Products Corp., P. O. Box 1027, Providence, R. I.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.

**GAGES, Height**

Amco Gage Co., 19760 W. 8 Mile Rd., Detroit 19, Mich.  
 Ames, B. C., Co., Waltham 54, Mass.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Starrett, The L. S. Co., Athol, Mass.

**GAGES, Plug, Ring and Snap**

Amco Gage Co., 19760 W. 8 Mile Rd., Detroit 19, Mich.  
 Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Carboly Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
 Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Federal Products Corp., P. O. Box 1027, Providence, R. I.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 Greenfield Tap & Die Corp., Greenfield, Mass.  
 Hanson-Whitney Co., Div., Whitney Chain Co., Hartford, Conn.  
 Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.  
 Kennametal Inc., Latrobe, Pa.  
 Metal Carbides Corp., Youngstown, Pa.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Standard Gage Co., Inc., Poughkeepsie, N. Y.  
 Starrett, The L. S. Co., Athol, Mass.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.  
 Turner Bros. Inc., 2625 Hilton Rd., Ferndale 20, Mich.  
 Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass.  
 Vinco Corp., 9113 Schaefer Hwy., Detroit 28, Mich.  
 Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

**GAGES, Surface**

Amco Gage Co., 19760 W. 8 Mile Rd., Detroit 19, Mich.  
 Ames, B. C., Co., Waltham 54, Mass.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Columbus Die-Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Hanson-Whitney Co., Div., Whitney Chain Co., Hartford, Conn.  
 Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
 Millers Falls Co., Greenfield, Mass.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Starrett, The L. S. Co., Athol, Mass.

**GAGES, Taper**

Brown & Sharpe Mfg. Co., Providence, R. I.  
 Dearborn Gage Co., 22038 Beech St., Dearborn, Mich.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Starrett, The L. S. Co., Athol, Mass.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.

**GAGES, Thread**

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif.  
 Detroit Tap & Tool Co., 8615 E. 8 Mile Rd., Base Line, Mich.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Federal Products Corp., P. O. Box 1027, Providence, R. I.  
 Greenfield Tap & Die Corp., Greenfield, Mass.  
 Hanson-Whitney Co., Div., Whitney Chain Co., Hartford, Conn.  
 Iroquois Corp., RFD 4 Box 331, 1800 E. 11 Mile Rd., Royal Oak, Mich.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.

**GASKETS**

Crane Packing Co., 1800 Cuyler Ave., Chicago.  
 Garlock Packing Co., Palmyra, N. Y.

**GEAR BLANKS, Non-Metallic**

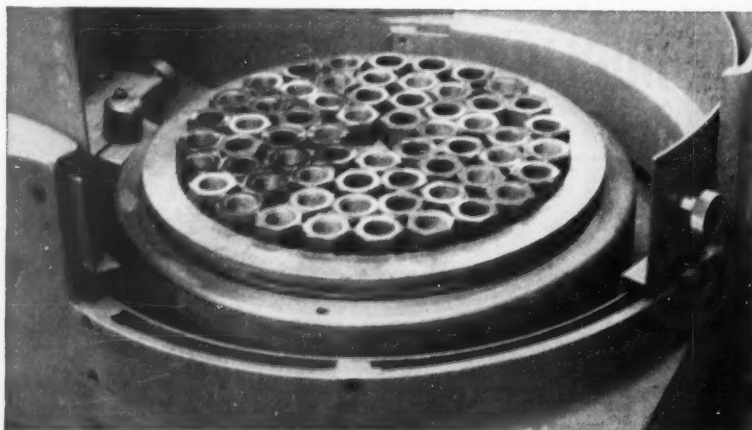
Braun Gear Co., 239 Richmond, Brooklyn 8, N. Y.  
 General Electric Co., Schenectady 5, N. Y.

**GEAR BURNISHING MACHINES**

Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.

**GEAR CHAMFERING, ROUNDING AND BURNING MACHINES**

Bilgram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa.  
 Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
 (Continued on page 338)



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1. Another interesting holding problem solved by WALKER.
2. Your holding problem too can be solved by WALKER engineers.
3. Each WALKER solution means efficiency . . . effectiveness . . . economy.
4. Over sixty years of WALKER know-how is no farther away than your telephone — Worcester 6-6293.

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**O. S. WALKER CO. Inc.**

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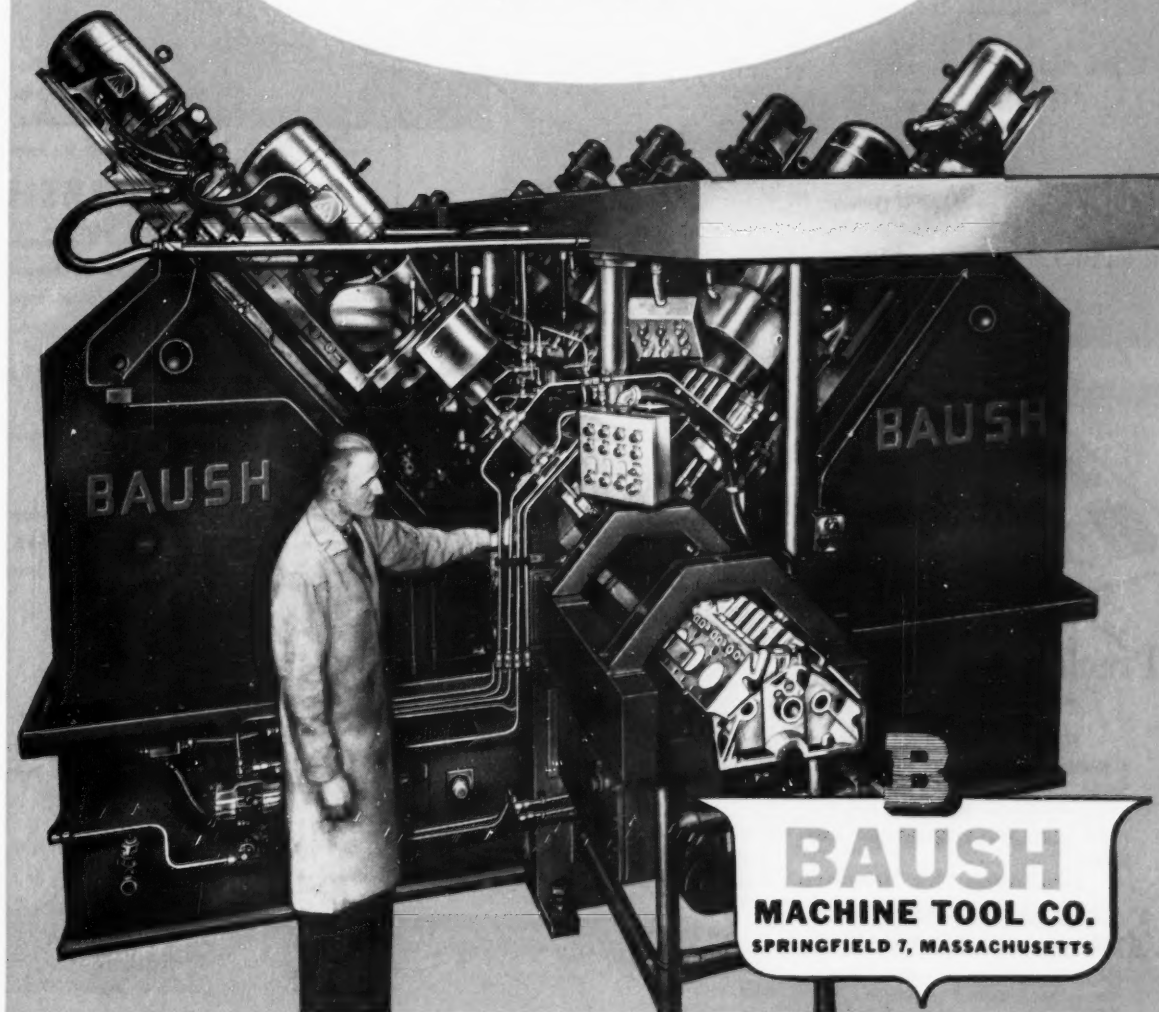
*Original Designers and Builders of Magnetic Chucks*

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## AUTOMATIC TRANSFER LINE . . .

**Insures high production — maintains accurate work —  
produces more — in less time and at lower cost!**

This 20-station Baush Automatic Mechanical Transfer Machine is furnished with fourteen (14) mechanical leadscrew units and two (2) special units and has checking fixture at Station 6. All made to J.I.C. Standards. . . All units and heads are readily accessible for tool changes. . . 105 machine operations completed on bank faces with a production of 109 V-8 cylinder blocks per hour at 100% efficiency. . . There is a Baush representative ready to work with you on your machine tool planning and production. Why not send us your prints—avail yourself of our more than 60 years of experience.





Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y.  
 Modern Industrial Engrg. Co., 14230 Birwood, Detroit 4, Mich.  
 Orban, Kurt Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.

#### GEAR CHECKING INSTRUMENTS AND EQUIPMENT

Brown & Sharpe Mfg. Co., Providence, R. I.  
 Eastman Kodak Co., Rochester, N. Y.  
 Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Starrett, The L. S. Co., Athol, Mass.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.  
 Vinco Corp., 9113 Schaefer Highway, Detroit 28, Mich.

#### GEAR CUTTING MACHINES, Bevel Gears (Generators)

Bilgram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa.  
 Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

#### GEAR CUTTING MACHINES

##### Bevel Gears, Spiral

Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

#### GEAR CUTTING MACHINES, Spur and Bevel Gears (Rotary Cutter)

Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Waltham Machine Works, Newton St., Waltham, Mass.

#### GEAR CUTTING MACHINES, Spur and Helical Gears (Hobbing)

Barber-Colman Co., Rock and Montague, Rockford, Ill.  
 Hirschmann Co., Carl, 30 Park Ave., Manhattan, N. Y.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.  
 Orban, Kurt Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

#### GEAR CUTTING MACHINES, Spur and Helical Gears (Shaper or Planer Type)

Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
 Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 National Tool Co., 11200 Madison Ave., Cleveland, Ohio.

#### GEAR CUTTING MACHINES, Worm and Worm Wheels

Barber-Colman Co., Rock and Montague, Rockford, Ill.  
 Cone-Drive Gear Div., Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 Fellows Gear Shaper Co., 78 River St., Springfield, Vt. (Straight and Hourglass Types).  
 Hirschmann Co., Carl, 30 Park Ave., Manhattan, N. Y.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

#### GEAR FINISHING MACHINES

Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.

#### GEAR GRINDING MACHINES

Cosa Corp., 405 Lexington Ave., New York 17.  
 Gear Grinding Machine Co., 3901 Christopher St., Detroit 11, Mich.  
 Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
 National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
 National Tool Co., 11200 Madison Ave., Cleveland, Ohio.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Van Norman Co., Springfield, Mass.

#### GEAR HARDENING MACHINES

Gleason Works, 1000 University Ave., Rochester 3, N. Y.

#### GEAR LAPPING MACHINES

Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.

#### GEAR MOTORS

See Speed Reducers.

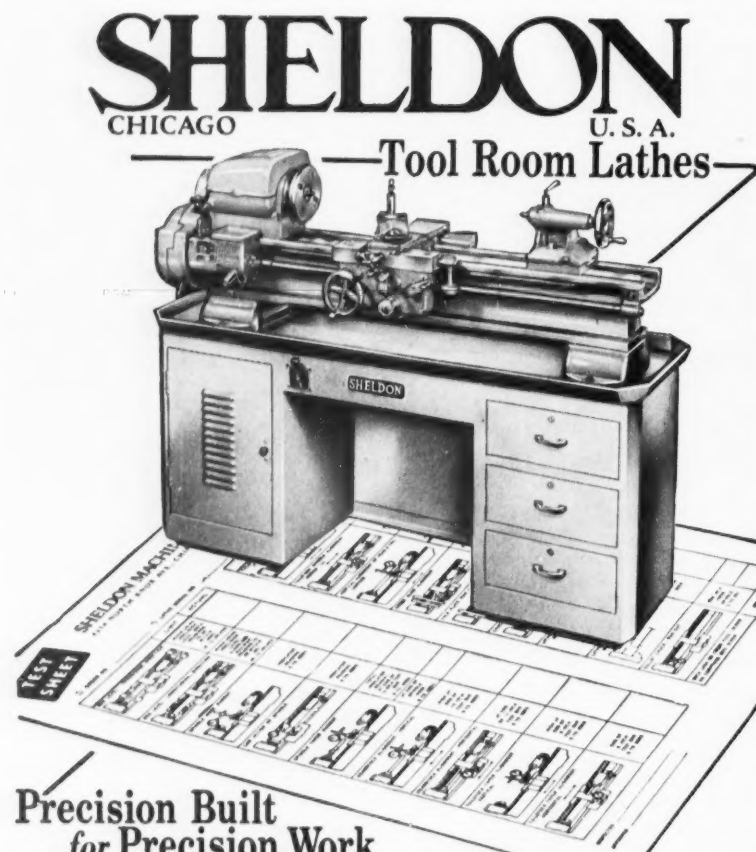
#### GEAR SHAVING MACHINES

Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.

#### GEAR TESTING MACHINERY

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Eastman Kodak Co., Rochester, N. Y.  
 Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
 Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

(Continued on page 340)



### Precision Built for Precision Work

Each SHELDON Lathe is a precision machine tool that in final inspection has passed the 19 accuracy checks on the SHELDON "Inspection Test Sheet."

Produced by modern

methods with the finest special machines, these 10", 11" and 12" (swings 13") lathes are quality built on a quantity production basis. Selling at quantity production prices they are today's best lathe values.

Write for Catalog with Check Chart

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4246 North Knox Ave.,  
Chicago 41, Illinois



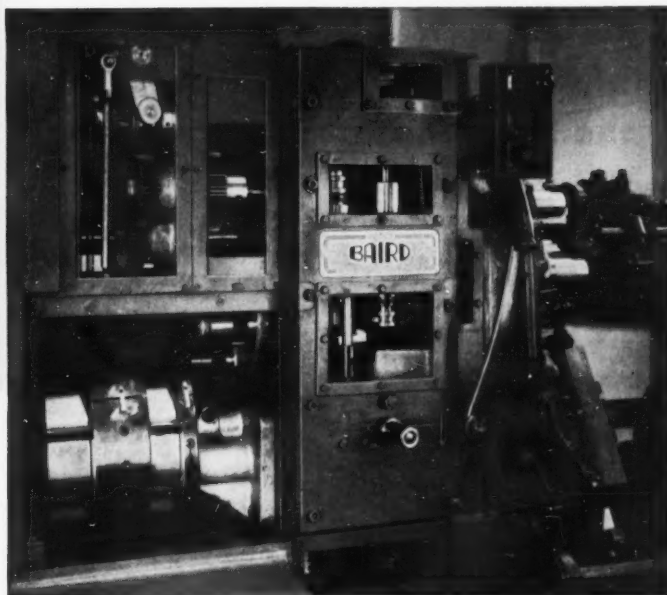
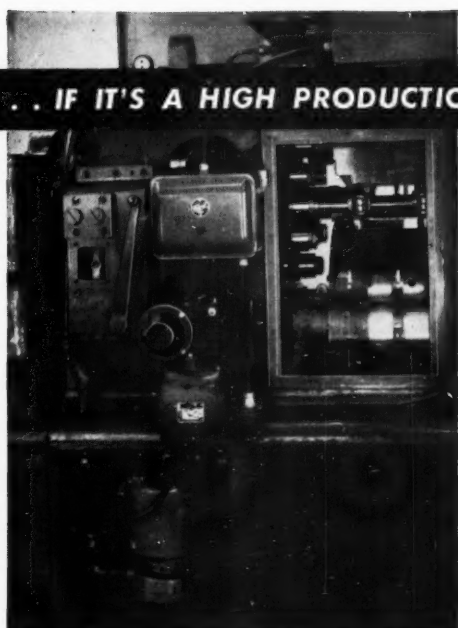
... IF IT'S A HIGH PRODUCTION PROBLEM ...

ASK



BAIRD

ABOUT IT



HERE'S BAIRD'S

*Guinea Pig*

WHERE WE WATCH OUR OPERATIONS... FOR YOUR BENEFIT

One of the features of Baird machines that customers like best is that when they are tooled and put on production . . . they produce. In many cases, however, arrival at that happy result in our customer's plant is by no means as simple as it sounds. Hence our "Guinea Pig" and other special Baird engineering procedures. The "Guinea Pig," as you can see from this photograph, is just that . . . a regular Baird Multiple Spindle Automatic, with plastic windows let into its "hide" at many vital points. By this means we can check details of operation under controlled conditions. Cams, gearing, controls, interlocks, tool slide action, temperatures, lubrication, wear . . . just about every factor in performance . . . is seen, gaged and compared.

And that, we believe, is typical of Baird's whole approach to high production machinery and tooling. For years, people have said "ASK BAIRD ABOUT IT" only because they know we will give them the right answer. Send in your inquiries, gentlemen — we're never too busy to help.

THE BAIRD MACHINE COMPANY  
STRATFORD CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS  
ON THESE ESSENTIAL PRODUCTION PROBLEMS:

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL  
FORMING MACHINES • AUTOMATIC PRESSES • TURNING BARREL

13A5

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—339

National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
 National Tool Co., 11200 Madison Ave., Cleveland, Ohio.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

### GEARS, CUT

Amgears, Inc., 6633 W. 65th St., Chicago 38, Ill.  
 Automotive Gear Works, Inc., Richmond, Ind.  
 Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.  
 Bilgram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa.  
 Boston Gear Works, 3200 Main St., North Quincy, Mass.  
 Brad Foote Gear Works, 1309 S. Cicero Ave., Cicero 50, Ill.  
 Braun Gear Co., 239 Richmond, Brooklyn 8, N. Y.  
 Cincinnati Gear Co., Wooster Pike and Mariemont Ave., Cincinnati, Ohio.

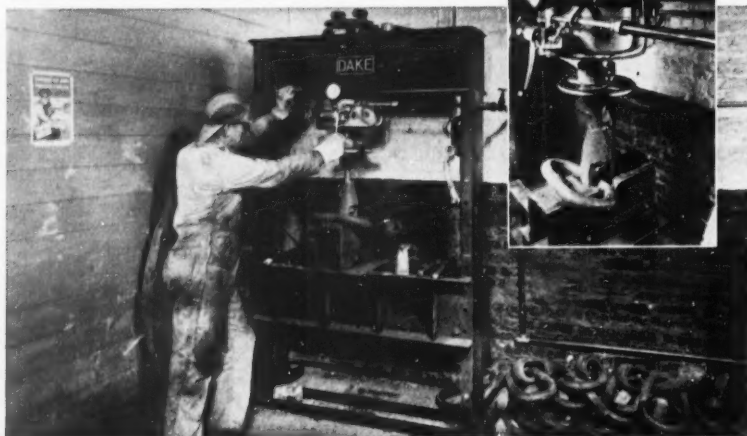
Cleveland Worm & Gear Co., 3249 E. 80th St., Cleveland, Ohio.  
 Cone-Drive Gears Div., Michigan Tool Co., 7200 E. McNichols Rd., Detroit, Mich.  
 Diefendorf Gear Corp., 920 N. Belden Ave., Syracuse, N. Y.  
 Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
 Franke Gear Works, Inc., 1924 W. Columbia Ave., Chicago 26, Ill.  
 Gear Specialties Inc., 2635 W. Medill Ave., Chicago 47, Ill.  
 Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.  
 Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
 Illinois Gear & Mch. Co., 2120 No. Natchez Ave., Chicago 35, Ill.  
 Mass. Gear & Tool Co., 36 Nassau St., Woburn, Mass.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
 National Broach & Machine Co., 5600 St. Jean St., Detroit 13, Mich.  
 New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.  
 Ohio Gear Co., 1333 E. 179th St., Cleveland.

Perkins Machine & Gear Co., West Springfield, Mass.  
 Philadelphia Gear Works, Erie Ave., and G St., Philadelphia, Pa.  
 Pittsburgh Gear Co., Neville Island, Pittsburgh 25, Pa.  
 Sier-Bath Gear & Pump Co., Inc., 9248 Hudson Blvd., North Bergen, N. J.  
 Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 14, Ohio.  
 Williamson Gear & Machine Co., 2606 Martha St., Philadelphia 25, Pa.

### GEARS, Rawhide and Non-Metallic

Amgears, Inc., 6633 W. 65th St., Chicago 38, Ill.  
 Boston Gear Works, 3200 Main St., North Quincy, Mass.  
 Braun Gear Co., 239 Richmond, Brooklyn 8, N. Y.  
 Cincinnati Gear Co., Wooster Pike and Mariemont Ave., Cincinnati, Ohio.  
 Diefendorf Gear Corp., 920 N. Belden Ave., Syracuse, N. Y.  
 Gear Specialties, Inc., 2635 W. Medill Ave., Chicago 47, Ill.  
 Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.  
 Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
 Ohio Gear Co., 1333 E. 179th St., Cleveland.  
 Philadelphia Gear Works, Erie Ave., and G St., Philadelphia, Pa.  
 Pittsburgh Gear Co., Neville Island, Pittsburgh 25, Pa.  
 Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 14, Ohio.  
 Williamson Gear & Machine Co., 2606 Martha St., Philadelphia 25, Pa.

## A DAKE PRESS replaces the "hernia method" of driving plugs out of cable sockets



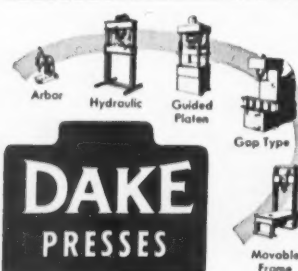
**A** concern that supplies cable slings for steel mills re-uses the closed-type sockets after driving out the cable-and-solder plugs.

Knocking them out was formerly a "brutal" job for two men. One held a driving pin, while the other swung powerful blows with a sledge. Working full time, they couldn't keep up with production requirements, and it was difficult to keep men for such hard manual labor.

Today, one man handles the entire job easily with a Dake Press, in 16 to 20 hours a week. Labor cost is less than 25%, and workers are mighty glad that the rugged hand sledging days are over.

Are you using Dake Presses for the hard jobs in your shop? Dake Catalog 129 shows many standard arbor and hydraulic presses . . . or, if you have a special problem, Dake can custom engineer a press to your particular needs. Why not ask?

**Dake Engine Company,** 604 Seventh St., Grand Haven, Mich.



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 604 Seventh St., Grand Haven, Mich.  
 Please send me a copy of Dake Catalog No. 129  
 Name \_\_\_\_\_  
 Company \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

### GENERATORS, Electric

General Electric Co., Schenectady 5, N. Y.  
 Lincoln Electric Co. (Arc), 22801 St. Clair Ave., Cleveland, Ohio.  
 Reliance Electric & Engrg. Co., 1074 Ivanhoe Rd., Cleveland 10, Ohio.

### GRADUATING MACHINES

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.  
 Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.  
 Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.

### GREASE

Cities Service Oil Co., 70 Pine St., New York, N. Y.  
 Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.  
 Lubriplate Div., Fiske Bros. Refining Co., 129 Lockwood St., Newark 5, N. J.  
 Sinclair Refining Co., 600 5th Ave., New York, N. Y.  
 Standard Oil Co., (Indiana), 910 S. Michigan, Chicago, Ill.  
 Sun Oil Co., 1608 Walnut St., Philadelphia.  
 Texas Co., 135 E. 42nd St., New York, N. Y.

### GRINDERS, Carbide Tool

See Grinding Mches, Carbide Tool

### GRINDERS, Centerless

Van Norman Co., Springfield, Mass.

### GRINDERS, Die and Mold

Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

### GRINDERS, Oilstone, for Woodworking Tools

Mummert-Dixon Co., Hanover, Pa.

### GRINDERS, Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
 Ingersoll-Rand Co., Phillipsburg, N. J.  
 Keller Tool Co., Grand Haven, Conn.  
 Madison-Kipp Corp., Madison, Wis.  
 Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.

(Continued on page 342)

16 years ...



20,000 Bridgeports

... a record of  
acceptance from  
1938  
to  
1954

On August 8th, 1938, 16 years ago, the first BRIDGEPORT TURRET MILLING MACHINE left our old plant for the Precision Die Casting Co., at Syracuse, N. Y.

Judging from the number of milling machines produced up to that time, the Toolmaker and the Patternmaker shown here with the 20,000th machine were most optimistic when they had hopes they might be able to sell 5,000 of these machines before the market was saturated.

Either the judgment of these two men was very bad or the machine they had developed was awfully good, because the 20,000th machine left our new, modern plant on March 18th, consigned to the Pioneer Electric & Research Corporation, Forest Park, Illinois. ... and every 45 minutes of a 50-hour week, another "Bridgeport" goes forward to an impatiently waiting customer.

Rest assured we shall always do our best to merit your continued confidence in the "Bridgeport" as expressed in its outstanding record of acceptance.

***Bridgeport***

**MACHINES, INC.**

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

**GRINDERS, Portable Electric and Toolpost**

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md.  
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.  
Millers Falls Co., Greenfield, Mass.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.

**GRINDING FIXTURES**

Amco Gage Co., 19760 W. 8 Mile Rd., Detroit 19, Mich.  
Geometric Tool Co. (Die Chaser), Westville Station, New Haven 15, Conn.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.

**GRINDING MACHINES, Abrasive Belt**

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
Mattison Mch. Works, Rockford, Ill.  
Mead Specialties Co., 4114 North Knox Ave., Chicago 41, Ill.  
Walker-Turner Div., Kearney & Trecker Corp., 900 North Ave., Plainfield, N. J.  
Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

**GRINDING MACHINES, Bench**

Besley-Welles Corp., Beloit, Wis.  
Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis.  
Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.  
Hardinge Bros., Inc., 1418 College Ave., Elmira, N. Y.  
Millers Falls Co., Greenfield, Mass.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
Walker-Turner Div., Kearney & Trecker Corp., 900 North Ave., Plainfield, N. J.

**GRINDING MACHINES, Broach**

Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.  
Lapointe Mch. Tool Co., 34 Tower St., Hudson, Mass.

**GRINDING MACHINES, Camshaft**

Landis Tool Co., Waynesboro, Pa.  
Norton Co., 1 New Bond St., Worcester 6, Mass.

**GRINDING MACHINES, Carbide Tool**

Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass.  
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.  
Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Wiley's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

**GRINDING MACHINES, Centerless**

Cincinnati Grinders, Inc., Cincinnati, Ohio.  
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
Landis Tool Co., Waynesboro, Pa.

**GRINDING MACHINES, Chucking**

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt.  
Bullard Co., Brewster St., Bridgeport, Conn.  
Landis Tool Co., Waynesboro, Pa.

**GRINDING MACHINES, Crankshaft**

Landis Tool Co., Waynesboro, Pa.  
Norton Co., 1 New Bond St., Worcester 6, Mass.

**GRINDING MACHINES, Cylindrical**

Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Grinders, Inc., Cincinnati, Ohio.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Frauenthal Div., Kaydon Engineering Corp., Muskegon, Mich.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Landis Tool Co., Inc., Waynesboro, Pa.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Van Norman Co., 2640 Main St., Springfield 7, Mass.

**GRINDER MACHINES, Die Chaser**

Eastern Mch. Screw Corp., New Haven, Conn.  
Landis Machine Co., Waynesboro, Pa.

**GRINDING MACHINES, Disc**

Besley-Welles Corp., Beloit, Wis.  
Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.  
Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.  
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.  
Mattison Machine Works, Rockford, Ill.

(Continued on page 344)

The last tenth is the troublesome one—

~~.0003~~     ~~.0002~~     .0001



can get it for you  
because ARTER has it

Rotary Surface Grinders

Cylindrical Grinders

Internal Grinders

Carbide Tool Grinders

Tell our engineers your grinding troubles—

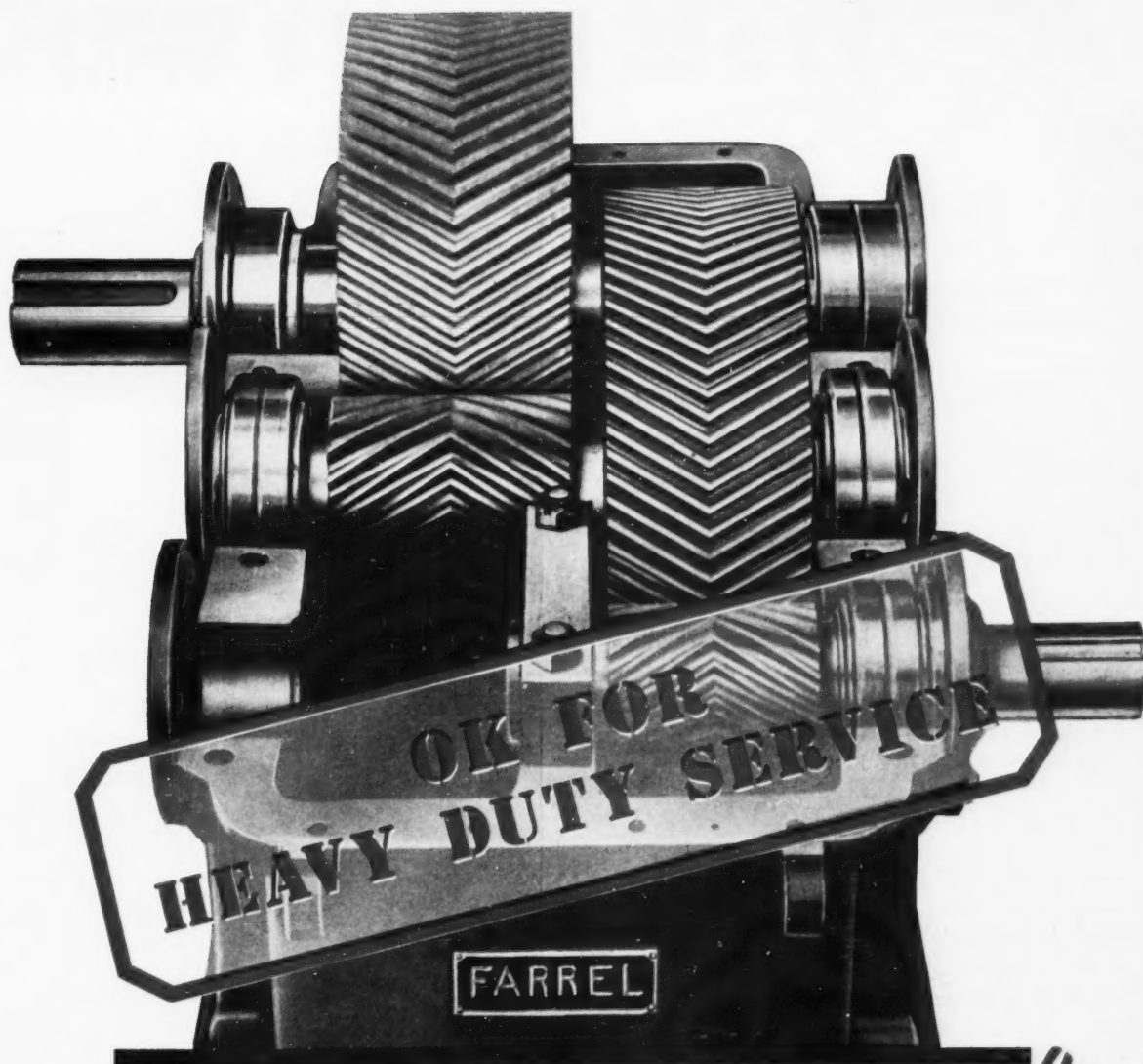
They are real troubleshooters.

**ARTER GRINDING MACHINE COMPANY**

**WORCESTER • MASSACHUSETTS**

Agents in principal industrial centers of United States and Canada





Farrel speed reducers can be relied on for dependable operation where conditions of service are unusual and exacting. The ability to adapt these units to specific requirements results from design experience gained by successfully solving innumerable problems requiring freedom in gear judgment.

To suit the application, the gears and pinions of Farrel speed reducers can be proportioned to meet specific load, speed and service conditions . . . input and output shafts can be varied in size, in material and in extension . . . housing dimensions can even be changed to meet problems in mounting.

Farrel supplies these units in a wide range of ratios and capacities. Designs include single, double, and multiple reduction units, speed-change units having two or more selective speeds, right angle drives, and drives to meet special requirements. Ask for Bulletin 449.

**FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.**

*Plants: Ansonia and Derby, Conn., Buffalo, N. Y.*

*Sales Offices: Ansonia, Buffalo, New York, Boston, Akron, Detroit, Chicago, Memphis, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans*

FB-930

**Farrel-Birmingham**®

For more information on products advertised, use Inquiry Card, page 245

## *Here's Why*

- 1** **PRECISION GEARS** have teeth generated by the famous Farrel-Sykes method—a process that assures accuracy of tooth spacing, profile and helix angle.
- 2** **OVERSIZE SHAFTS** are large for the power to be transmitted, giving added stiffness against bending and torsional deflection under peak loading variations.
- 3** **HIGH CAPACITY ROLLER BEARINGS** take radial and normal thrust loads, hold the shafts in precise alignment.
- 4** **CONTINUOUS SPLASH LUBRICATION** reliably supplies oil to all bearings and gear teeth.
- 5** **STURDY HOUSING** holds rotating elements in original alignment, preserves operating smoothness of the gearing.

MACHINERY, June, 1954—343

# It's a BIG idea...and it WORKS...

## THE IDEA OF STANDARDIZED GEARS

— of the highest quality, completely interchangeable —  
was originated by BOSTON Gear seventy-five years ago.

## IT HAD TO BE A BIG IDEA

To make the idea work, the gears had to be AVAILABLE quickly, to any buyer — anywhere. Distribution facilities had to be BIG as all industry, expanding with it. That's why BOSTON Gear Products are sold through Industrial Distributors.

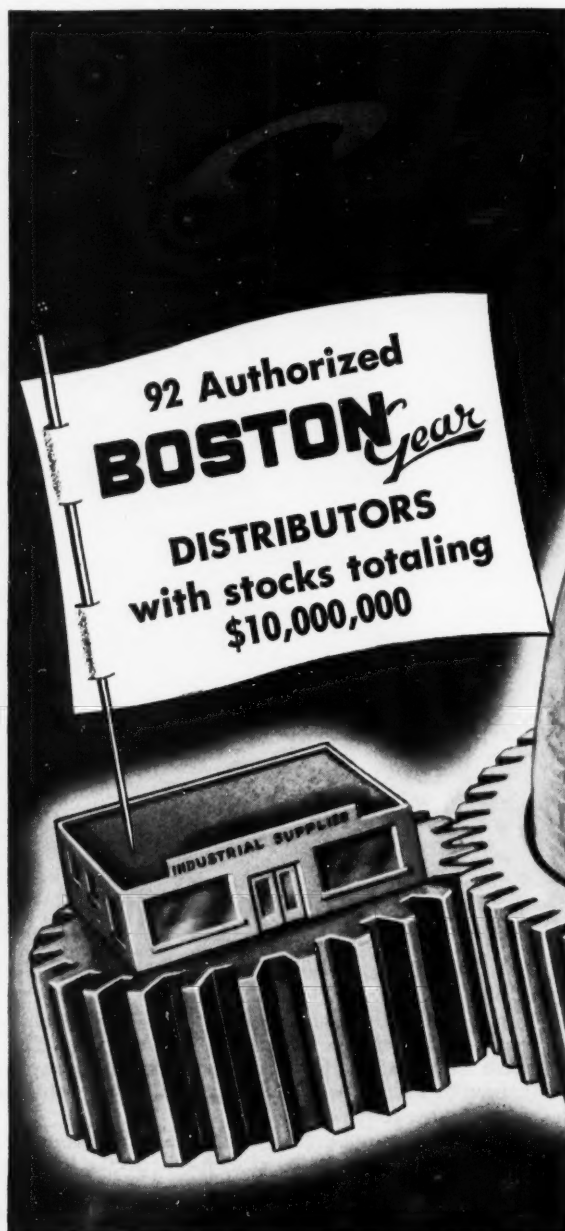
## YOUR BOSTON Gear DISTRIBUTOR

"brings the BOSTON Gear plant to you" — the benefits of a 75-year experience — the engineering counsel of transmission planning experts — full stocks of BOSTON Gear Products — and FACTORY PRICES!

## LET THIS IDEA WORK FOR YOU

To more than 250,000 cost-wise buyers, BOSTON Gear now means *best buy* for top quality, lasting economy, and trouble-saving convenience. Compare — you'll see why it will pay you to "Design around BOSTON Gear" . . . to specify BOSTON Gear for any maintenance need.

Call your nearby BOSTON Gear DISTRIBUTOR  
He has a factory-trained specialist ready to help you, Boston Gear Works, 65 Hayward St., Quincy 71, Mass.



STOCK GEARS — 2000 TYPES and SIZES



SPROCKETS and CHAIN



A \$10,000,000 STOCK • AT 92 LOCAL DISTRIBUTORS

Look under "Gears" in the Yellow Classified Section of your Telephone Directory for the BOSTON Gear Distributor nearest you.

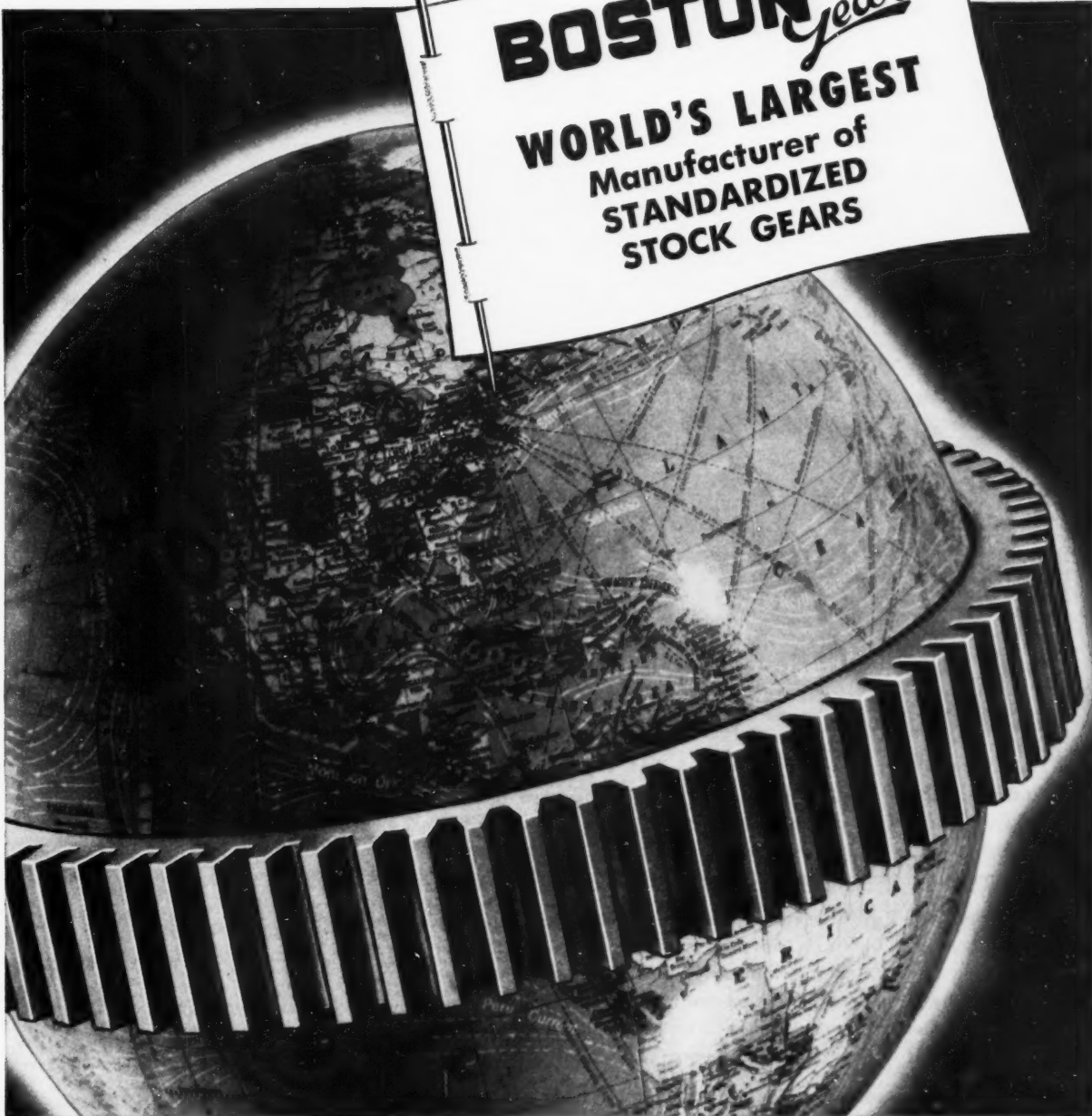


SHAFT SUPPORTS

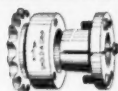


for YOU

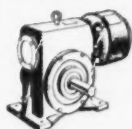
**BOSTON** *Gear*<sup>®</sup>  
**WORLD'S LARGEST**  
 Manufacturer of  
**STANDARDIZED**  
**STOCK GEARS**



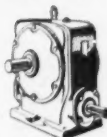
**SHOLD-A-GRIP**  
 Interchangeable Tapered  
 BUSHINGS and SPROCKETS



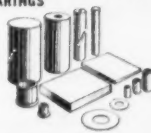
**RATIOMOTORS**



**REDUCTORS**



**BOST-BRONZ** Oil-impregnated  
 BEARINGS



Get Catalog No. 55  
 Industry's most  
 valued "textbook"  
 of drive design and  
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 includes 30 pages of  
 Engineering data.

**FOR PROMPT DELIVERIES AT FACTORY PRICES**

UNIVERSAL JOINTS



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BALL BEARINGS



For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—345



**GRINDING MACHINES, Drill**

Blake, Edward Co., 442 Cherry St., West Newton 65, Mass.  
 Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
 Galmeyer & Livingston Co., 336 Straight Ave., S. W. Grand Rapids 4, Mich.  
 Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.  
 Lehigh Foundries, Inc., 1500 Lehigh Dr., Easton, Pa.  
 Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.  
 Orban, Kurt Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Union Twist Drill Co., Athol, Mass.

**GRINDING MACHINES, Face**

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.  
 Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
 Besly-Weltes Corp., Beloit, Wis.  
 Columbia Div., Lodge & Shipley Co., Hamilton 1, Ohio.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

Mattison Machine Works, Rockford, Ill.  
 Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.  
 Orban, Kurt Co., Inc., 205 East 42nd St., New York 17, N. Y.

**GRINDING MACHINES, Flexible Shaft**  
See Flexible Shaft Equipment**GRINDING MACHINES, Gap**

Cincinnati Grinders, Inc., Cincinnati, Ohio.  
 Landis Tool Co., Waynesboro, Pa.

**GRINDING MACHINES, Gear Tooth**  
See Gear Grinding Machines**GRINDING MACHINES For Sharpening Cutters, Reamers, Hobs, Etc.**

Barber-Colman Co., Rock and Montague, Rockford, Ill.  
 Brown & Sharpe Mfg. Co., Providence, R. I.

Cincinnati Milling Mch. Co., Cincinnati, Ohio.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
 Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Galmeyer & Livingston Co., 336 Straight Ave., S. W. Grand Rapids 4, Mich.  
 Gleason Works, 1000 University Ave., Rochester 3, N. Y.  
 Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 Landis Tool Co., Waynesboro, Pa.  
 LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
 Norton Co., 1 New Bond St., Worcester 6, Mass.  
 Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.  
 Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Thompson Grinder Co., 1500 W. Main St., Springfield, Ohio.  
 Union Twist Drill Co., Athol, Mass.

**GRINDING MACHINES, For Sharpening Turning and Planing Tools**

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.  
 Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.  
 Orban, Kurt Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
 Walker, O. S. Co., Inc., Worcester, Mass.  
 Waltham Machine Works, Newton, Mass.  
 Waltham, Mass.

**GRINDING MACHINES, Internal**

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.  
 Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass.  
 Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt.  
 Columbia Div., Lodge & Shipley Co., Hamilton 1, Ohio.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Frauenthal Div., Kaydon Engineering Corp., Muskegon, Mich.  
 Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
 Orban, Kurt Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
 Wicaco Machine Corp., Stenton Ave. and Loudon St., Philadelphia, Pa.

**GRINDING MACHINES, Jig**

Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.  
 Pratt & Whitney, West Hartford 1, Conn.

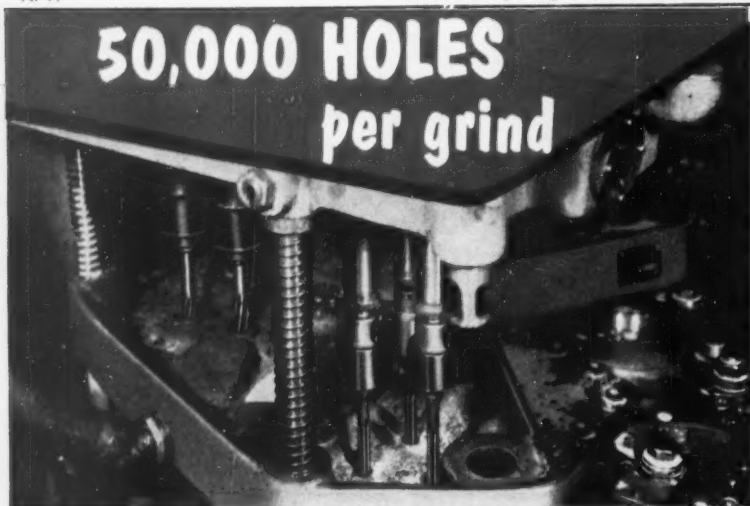
**GRINDING MACHINES, Knife and Shear Blade**

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.  
 Columbia Div., Lodge & Shipley Co., Hamilton 1, Ohio.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
 Mattison Machine Works, Rockford, Ill.  
 United States Electrical Tool Div., Emerson Elec. Mfg. Co., 1050 Findlay St., Cincinnati 14, Ohio.

**GRINDING MACHINES, Piston Ring**

Besly-Weltes Corp., Beloit, Wis.  
 Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.  
 Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
 Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.  
 Mattison Machine Works, Rockford, Ill.  
 Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati 4, Ohio.

(Continued on page 348)



Many manufacturers are discovering that Whitman & Barnes carbide reamers reduce machine down-time and costs by providing more holes per grind. Typical is the above illustrated reaming of 1/2" diameter holes in the cast iron planet carrier assembly at a well known automobile plant.

Six flute W & B carbide reamers were selected by this Michigan manufacturer to secure on this tough operation a maximum number of reamed holes per grind. These W & B carbide reamers are consistently reaming 50,000 or more holes before regrinding is required. This high performance is characteristic of the quality designed and manufactured into every W & B carbide reamer.

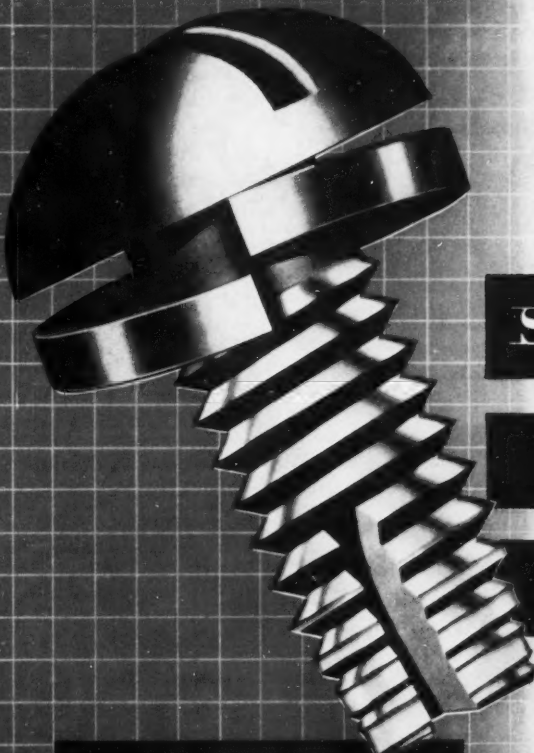
In addition to complete lines of carbide drills and reamers, Whitman & Barnes manufactures many other carbide cutting tools, also drills and reamers of high speed steel. For finest quality, long-life and a reduction in your cutting costs—select W & B tools.

## WHITMAN & BARNES

40040 PLYMOUTH ROAD • PLYMOUTH, MICH.

NEW YORK • CHICAGO • LOS ANGELES • ATLANTA





## Eaton - Reliance Thread - Cutting

**SPRINGTTITES & SEMS**

**Fabricate Products**

**Faster at *Less Cost***



Type 1 for steel and  
stainless steel



Type 23 for die-castings  
and light metals



Type 25 for-Plastics

**T**HE elimination of one expensive machining operation on the production line can sometimes mean the difference between profit and loss on a job. If you have a fastening operation which necessitates tapping, look into Eaton Reliance Thread-cutting Springtites and Sems. They are self tapping and actually tap as they fasten. It's all done in one operation wherein the clean, tightly seated threads don't have a chance to mis-mate or strip.

Your production people will find them easy to use regardless of the material. Manufactured with built-on helical or multi-toothed type washers, they are made for steel and stainless steel, die-castings and light metals, and plastics. Also available without washers. Many design



engineers and production men are effecting great savings through faster production. For more detailed information write for our Engineering Bulletin S-49A. It's yours for the asking and of course, there's no obligation.

**RELIANCE DIVISION**

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SALES OFFICES: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal



MANUFACTURING COMPANY



Springtites & Sems Snap & Retaining Rings Special Steels Spring Lock Washers Hex Fasteners

**GRINDING MACHINES, Profile**

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
 Cleveland Grinding Machine Co., 1643 Eddy Rd., Cleveland 12, Ohio.  
 Cosa Corp., 405 Lexington Ave., New York 17, Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.  
 Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.

**GRINDING MACHINES, Ring Wheel Ball Race, Etc.**

Besly-Welles Corp., Beloit, Wis.  
 Frauenthal Div., Kaydon Engineering Corp., Muskegon, Mich.  
 Landis Tool Co., Waynesboro, Pa.  
 Van Norman Co., Springfield, Mass.

**GRINDING MACHINES, Radial**

Columbia Div., Lodge & Shipley Co., Hamilton 1, Ohio.  
 Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

**GRINDING MACHINES, Radius, Link**

Besly-Welles Corp., Beloit, Wis.  
 Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.  
 Mattison Machine Works, Rockford, Ill.  
 Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati 4, Ohio.

**GRINDING MACHINES, Roll**

Farrel-Birmingham Co., 25 Main St., Ansonia Conn.  
 Landis Tool Co., Waynesboro, Pa.  
 Norton Co., 1 New Bond St., Worcester 6, Mass.

**GRINDING MACHINES, Spline Shaft**

Van Norman Co., Springfield, Mass.

**GRINDING MACHINES, Surface**

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.  
 Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass. (Rotary)  
 Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
 Besly-Welles Corp., Beloit, Wis.  
 Blanchard Machine Co., 64 State St., Cambridge, Mass.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Columbia Div., Lodge & Shipley Co., Hamilton 1, Ohio  
 Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
 DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
 Frauenthal Div., Kaydon Engineering Corp., Muskegon, Mich.  
 Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.  
 Gollmeyer & Livingston Co., 336 Straight Ave., S. W. Grand Rapids 4, Mich.  
 Heald Machine Co., 10 New Bond St., Worcester 6, Mass.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
 Mattison Machine Works, Rockford, Ill.  
 Norton Co., 1 New Bond St., Worcester 6, Mass.  
 Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Reid Bros. Co., Inc., Beverly, Mass.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Standard Electrical Tool Co., 2488-90 River Rd., Cincinnati 4, Ohio.  
 Toff-Peirce Mfg. Co., Woonsocket, R. I.  
 Thompson Grinder Co., 1500 W. Main St., Springfield, Ohio.  
 Walker, O. S., Co., Inc., Worcester, Mass.

**GRINDING MACHINES, Tap**

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.

**GRINDING MACHINES, Thread**

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
 Landis Machine Co. (Centerless), Waynesboro, Pa.  
 Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.

**GRINDING MACHINES, Universal**

Brown & Sharpe Mfg. Co., Providence, R. I.  
 Cincinnati Grinders, Inc., Cincinnati, Ohio.  
 Frauenthal Div., Kaydon Engineering Corp., Muskegon, Mich.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 Landis Tool Co., Waynesboro, Pa.  
 Norton Co., 1 New Bond St., Worcester 6, Mass.  
 Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.

**GRINDING MACHINES, Worm**

Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
 Pratt & Whitney, West Hartford 1, Conn.

**GRINDING WHEELS**

Allison Co., Bridgeport, Conn.  
 Besly-Welles Corp., Beloit, Wis.  
 Blanchard Machine Co., 64 State St., Cambridge, Mass.  
 Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.  
 Cincinnati Milling Products Div., Cincinnati Milling Machine Co., Cincinnati, Ohio.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Gardner Machine Co. (Surface Grinder), 414 E. Gardner St., Beloit, Wis.  
 Norton Co., 1 New Bond St., Worcester 6, Mass.  
 Simonds Abrasive Co., Tacony and Fraley Sts., Bridesburg, Philadelphia, Pa.  
 Smit, J. K. & Sons, Inc., Murray Hill, N. J.

**GROOVE PINS**

Gillen, John, Co., Inc., 2540 S. 50th Ave., Cicero 50, Ill.

(Continued on page 350)

**ON YOUR TAPPING JOBS!**

Proconier Tappers are the last word in economical, efficient, high speed tapping. More and more manufacturers are realizing that Proconier offers them the solution to their steadily rising production costs on many tapping operations. Only Proconier has the unique construction features that permit inexperienced operators to tap like experts. Proconier Tappers provide many extra hours of continuous, accurate tapping without frequent "down-time" interruptions. Proconier Tappers are producing more — with fewer rejections, fewer spoiled pieces and a minimum of broken taps.

There are many reasons for Proconier's superiority in the tapping industry. Here are just a few of the many remarkable mechanical improvements that only Proconier provides: new sensitive double cone friction clutch; soft cushioned action driving pressure; ballbearing equipped; heat treated gears; special balanced gear reversing mechanism; smaller-lighter more accurate tru-grip tap holder; and many others.

**Write for FREE Brochure**

Giving full particulars on the complete line of Proconier Tapping Machines. Learn how you can adapt them to your specific needs.



NEW  
"TRU-GRIP"  
TAP HOLDER

The exclusive Proconier "Tru-Grip" tap holder is lighter, smaller in diameter, fits closer to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

**Proconier**

*Safety Chuck Company*

16 S. CLINTON ST., CHICAGO 6, ILL.

PROCONIER SAFETY CHUCK CO.

16 S. Clinton St., Chicago 6, Ill. Dept. 6

Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the Tap King and your complete line of tapping attachments.

Name .....

Address .....

City ..... Zone ... State .....

*In Step with Light Metal*

**PROGRESS...**

**WATSON-STILLMAN**

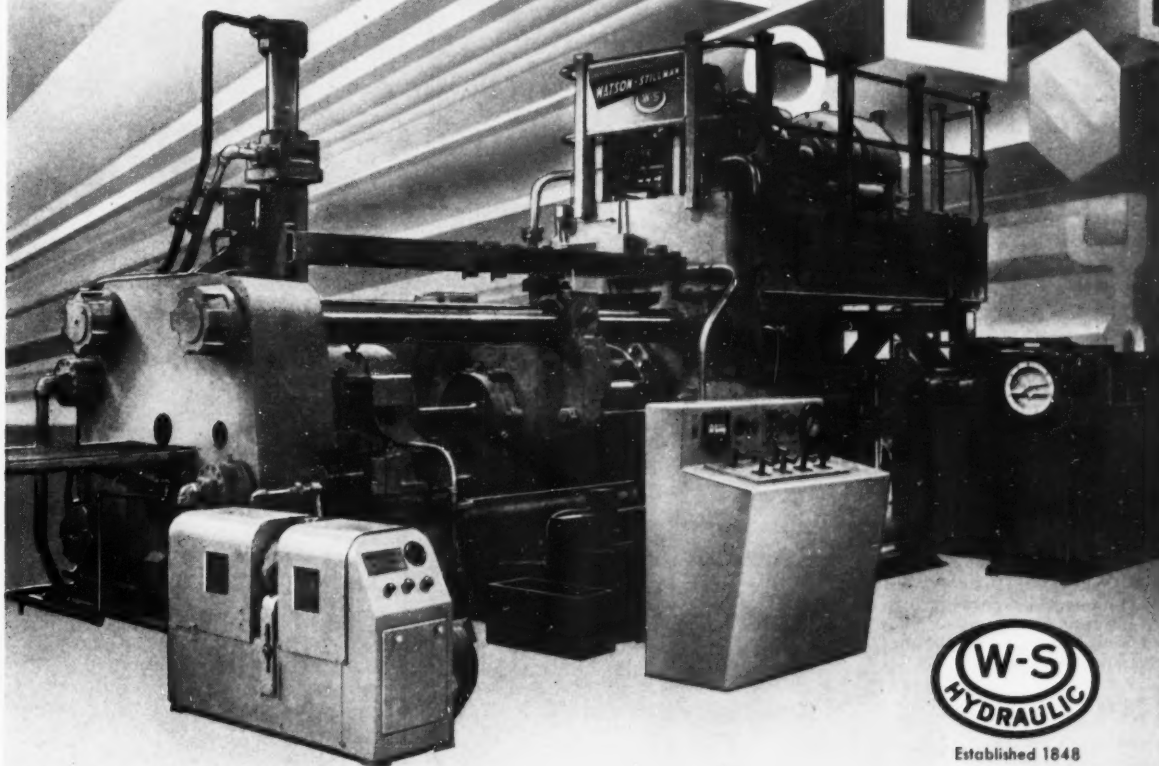
**The Pioneers and Leaders in Design and  
Manufacture of Hydraulic Extrusion Presses**

W-S hydraulic press engineering and manufacture—based on over 100 years of experience with scores of basic industries in which extrusion plays an important part—has kept pace with the rapid growth in processing light metals.

The "Compleline" of W-S Aluminum Extrusion Presses will meet every light metal extrusion need.

When you specify Watson-Stillman you get the finest equipment available. Every step in the manufacture of your press—design, engineering, pattern making, machining, assembly, testing and shipment—is conducted within the Watson-Stillman plant—carefully supervised to assure complete quality control of your equipment.

If you are planning to install your own extrusion plant or expand your present facilities—consult Watson-Stillman first.



WATSON-STILLMAN 1250 TON  
ALUMINUM EXTRUSION PRESS



Established 1848

**THE WATSON-STILLMAN COMPANY**

**DIVISION OF H. K. PORTER COMPANY, INC.**

161 Aldene Rd., Roselle, New Jersey

3013



**GROOVING TOOLS, Internal**

Waldes Kohinoor, Inc., 4716 Austel Place,  
Long Island City 1, N. Y.

**HAMMERS, Drop**

Bliss, E. W. Co., 1375 Raff Rd., S. W. Canton,  
Ohio.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Erie Foundry Co., Erie, Pa.  
Morgan Engrg. Co., Alliance, Ohio.

**HAMMERS, Forging Air**

Chambersburg Engrg. Co., Chambersburg, Pa.  
Lobdell United Co., 200 "G" St., Wilmington  
99, Del.

**HAMMERS, Pneumatic**

Chambersburg Engrg. Co., Chambersburg, Pa.  
Chicago Pneumatic Tool Co., 6 E. 44th St.,  
New York, N. Y.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Keller Tool Co., Grand Haven, Mich.

**HAMMERS, Portable Electric**

Black & Decker Mfg. Co., E. Penna. Ave.,  
Towson, Md.  
Millers Falls Co., Greenfield, Mass.

**HAMMERS, Power**

Chambersburg Engrg. Co., Chambersburg, Pa.  
Lobdell United Co., 200 "G" St., Wilmington  
99, Del.

**HAMMERS, Shaft**

S K F Industries, Inc., P.O. Box 6731, North  
Philadelphia, Pa.  
Standard Pressed Steel Co., Jenkintown, Pa.

**HAMMERS, Soft**

Chambersburg Engrg. Co., Chambersburg, Pa.  
Erie Foundry Co., Erie, Pa.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo  
7, N. Y.

**HARDENING EQUIPMENT**

Gleason Works, 1000 University Ave., Roches-  
ter, N. Y.  
Ohio Crankshaft Co., 3800 Harvard Ave.,  
Cleveland, Ohio.

**HARDENING MACHINES, Flame**

Cincinnati Milling Machine Co., Cincinnati  
Ohio.  
Gleason Works, 1000 University Ave., Roches-  
ter, N. Y.

**HARDNESS TESTING INSTRUMENTS**

Scherr, George, Co., Inc., 200 Lafayette St.,  
New York 12, N. Y.  
Shore Instrument & Mfg. Co., Van Wyck Ave.  
and Carl St., Jamaica, N. Y.  
Wilson Mechanical Instrument Co., Inc., 230-D  
Park Ave., New York, N. Y.

**HEADING MACHINES**

National Machinery Co., Greenfield and Stan-  
ton Sts., Tiffin, Ohio.

**HOBGING MACHINES**

See Gear Cutting Machines, Spur and  
Helical Gears (Hobbing), and Gear  
Cutting Machines, Worm and Worm  
Wheels.

**HOBS**

Barber-Colman Co., Rock and Montague, Rock-  
ford, Ill.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Hanson-Whitney Co., Div., Whitney Chain Co.,  
Hartford, Conn.  
Michigan Tool Co., 7171 E. McNichols Rd.,  
Detroit 12, Mich.  
National Tool Co., 11200 Madison Ave., Cleve-  
land, Ohio.  
National Twist Drill & Tool Co., Rochester,  
Mich.  
New Jersey Gear & Mfg. Co., 1470 Chestnut  
Ave., Hillside, N. J.  
Union Twist Drill Co., Athol, Mass.

**HOIST HOOKS**

Bethlehem Steel Co., Bethlehem, Pa.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo  
7, N. Y.

**HOISTING AND CONVEYING  
EQUIPMENT**

Cleveland Crane & Engrg. Co., Wickliffe, Ohio.

**HOISTS, Air**

Chicago Pneumatic Tool Co., 6 E. 44th St.,  
New York, N. Y.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Keller Tool Co., Grand Haven, Mich.

**HOISTS, Chain, Etc.**

Ryerson, Jos. T. & Son, Inc., 2558 W. 16th St.,  
Chicago 18, Ill.

**HOISTS, Electric**

Philadelphia Gear Works, Inc., Erie Ave. and  
G St., Philadelphia, Pa.

(Continued on page 354)

## For High Production and Low Maintenance Costs \*

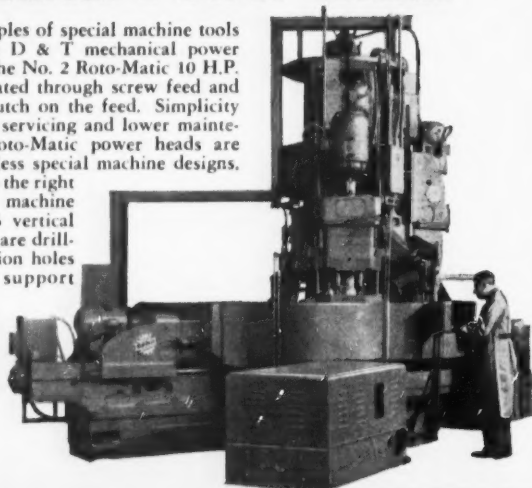


## Use D & T Machines With New Mechanical Power Heads

Here are two good examples of special machine tools designed and built with D & T mechanical power heads. Shown above, is the No. 2 Roto-Matic 10 H.P. head. All sizes are operated through screw feed and have overload release clutch on the feed. Simplicity of design makes for less servicing and lower maintenance costs. D & T Roto-Matic power heads are readily adapted to countless special machine designs. For instance: Machine to the right is a 6 station indexing machine with 3 horizontal and 3 vertical power heads. Operations are drilling and reaming suspension holes and king pin holes in support arms for power heads.

### Free Data

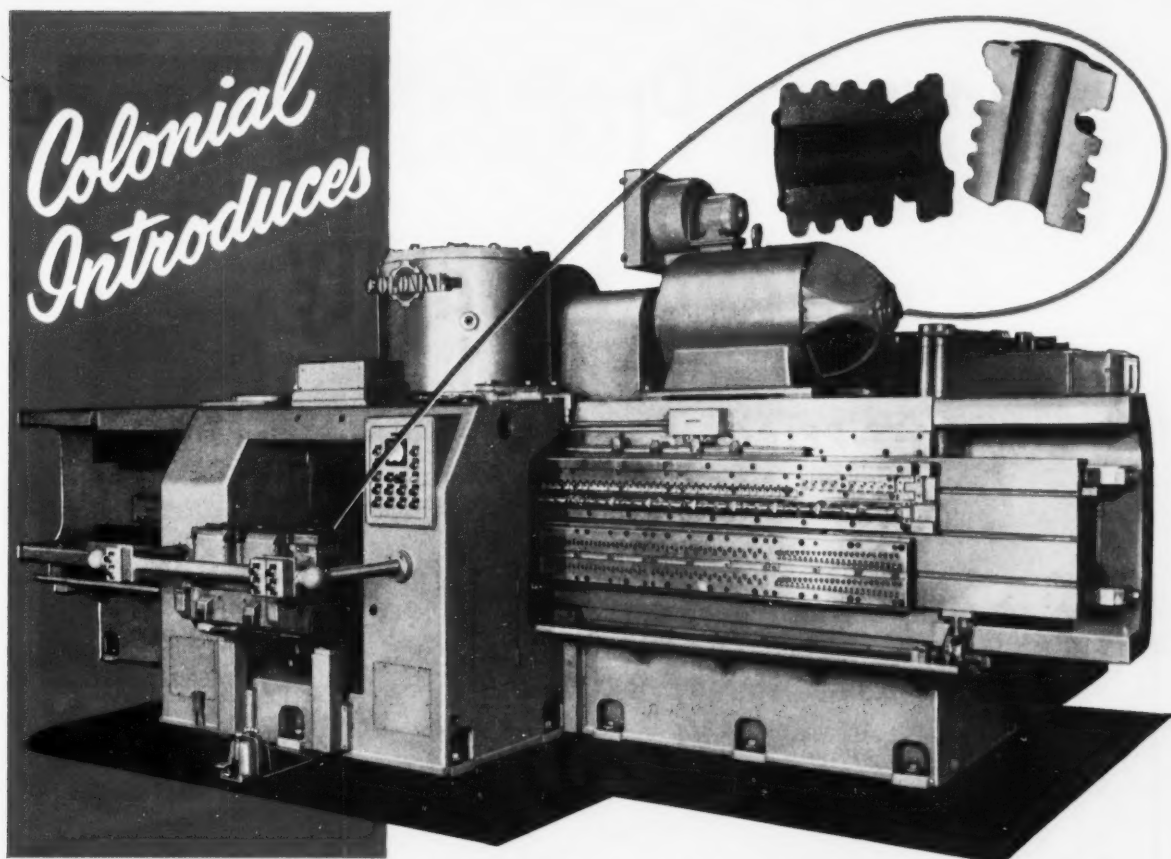
is available on the complete line of D & T machines. Ask for Bulletin 1000.



**Davis & Thompson Company**

6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN





## Colonial Introduces the **MECHANICAL HORIZONTAL**

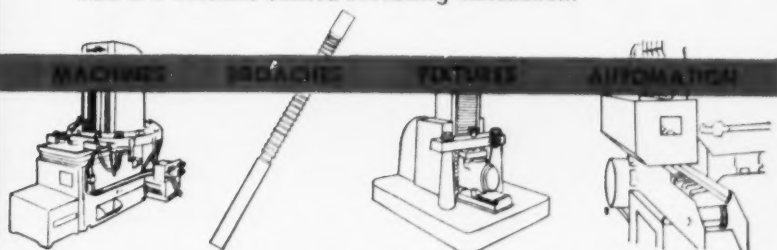
**for faster  
broaching  
of surfaces**

The model HM-25-130, is the first in a new line of Colonial MECHANICAL HORIZONTALS. It removes  $3\frac{1}{2}$  pounds of metal, with depth of cut varying from  $5/32$  to  $3/16$  of an inch, in a 21-second broaching cycle from two cast iron bearing cap clusters. Tungsten carbide-tipped tool bits mounted on the 24" wide ram, travel at more than 140 feet per minute. The machine broaches on both the forward and return strokes, doubling the length of cutting action as compared to ordinary broaching. The machine has a 130-inch stroke and 25-ton capacity. Broaching speed is variable (30 to 150 sfm) through rheostat control of the direct current 150 hp motor.

Trunnion-type fixture has hydraulic clamping, positioning, and shuttling. All automatic cycle hydraulic and electrical controls are interlocked, and this equipment is installed according to J.I.C. standards. Table level loading of work and floor level accessibility of the broach inserts and practically all operating parts are important features of the machine. Floor space is 194 x 290 inches.

This is a Colonial Unified Broaching Installation.

*Unified Broaching*  
**COLONIAL**  
BROACH CO. DIV. OF THE COLONIAL GROUP



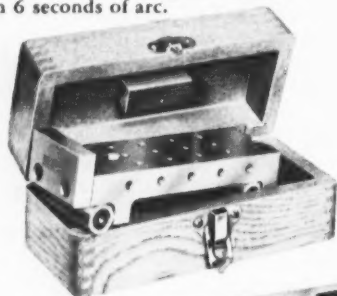
# Increase Production Range and Capacity

with these  
**TAFT-PEIRCE Specialties for Precision Work**

## Tools for Angle Work

### T-P DIVIDING HEAD

offers a rapid, accurate means for dividing the work circle. Used in measuring and inspecting splines, gears, cams, and other parts. Reads within 6 seconds of arc.



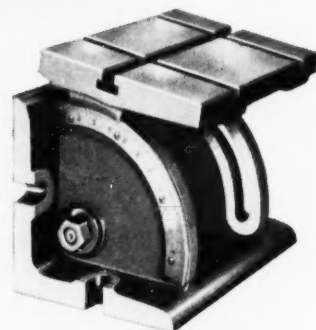
### T-P SINE BARS & SINE BLOCKS

First conceived and built by Taft-Peirce, they locate work to any given angle within very close limits. Tapped holes permit clamping.



### T-P TOOLMAKER'S ADJUSTABLE KNEE

simplify inspection or setup of angular work. Graduated quadrant and vernier reads to 5 minutes of angle.



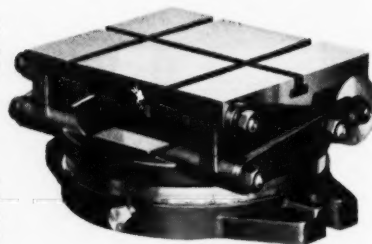
### T-P ANGLE BLOCKS

speed setup and grinding of small angular work on a magnetic chuck. Can be used individually or in any combination to form V-blocks.

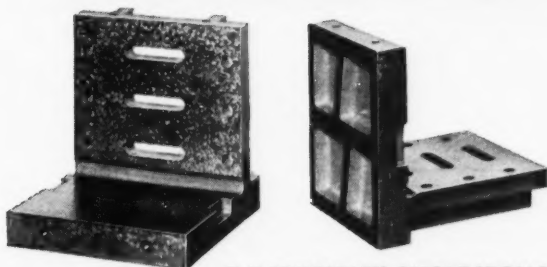


### T-P ADJUSTABLE ANGLE PLATE

tilts and turns. Makes compound angles easy to setup for machining. Both tilting table and rotating base are graduated from 0 to 90 degrees in each direction.

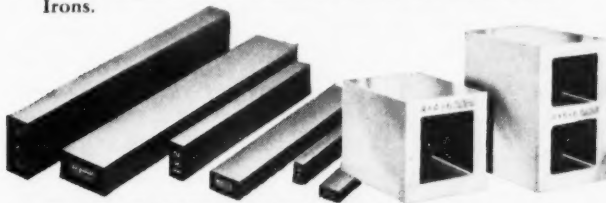


## Reference Surface Tools



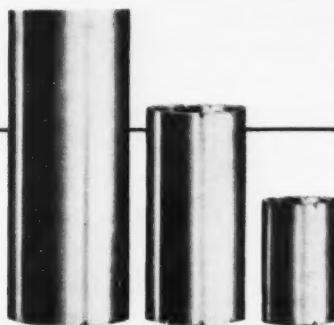
**T-P MULTIPLEX ANGLE IRONS**

All surfaces are scraped accurately flat for faster, easier setups. Other types available include Duplex Angle Irons, Slotted Angle Irons, Toolmaker's Knees, and Measuring Irons.



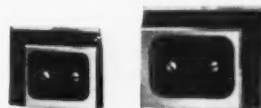
**T-P STEEL AND BOX PARALLELS**

are available in a complete line of stock sizes. Also, Planer and Boring Machine Parallels, Levelling Straight Edges, and Steel Straight Edges.



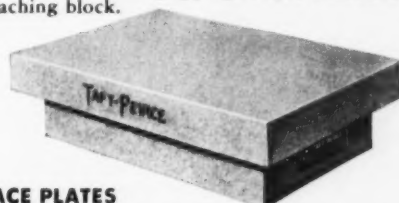
**T-P CYLINDRICAL SQUARES**

Used with T-P Surface Plate they provide a convenient, accurate reference line for any vertical work-surface.



**T-P UNIVERSAL SQUARES**

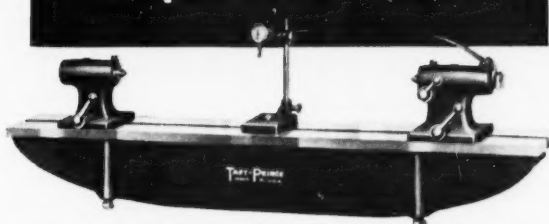
High precision squares that can be used in any position. Hard rubber center facilitates gripping . . . prevents hand heat from reaching block.



**T-P SURFACE PLATES**

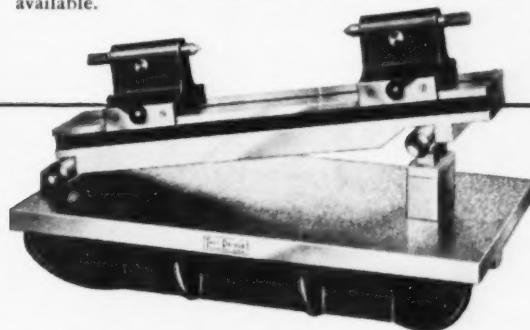
Extremely fine grain of T-P granite surface plates gives smoother more wear-resistant surface, assures top precision over longer periods. Cast Iron surface plates also available.

## Versatile Inspection Tools



**T-P BENCH CENTERS**

simplify inspection work. Have unusual rigidity and permanent accuracy. This is typical of a wide range of inspection tools available at Taft-Peirce.



**T-P TAPER TESTING FIXTURE**

combines a Sine Block with a pair of adjustable mounted precision centers. Checks tapers to high degree of accuracy.

**T-P COMPARATOR  
SQUARE**

permits accurate indication of squareness. Adaptable to both production and inspection work.



**THE TAFT-PEIRCE MANUFACTURING COMPANY**

WOONSOCKET, RHODE ISLAND

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—353

**HONING MACHINES, External**

Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
 Fulmer, C. Allen, Co., 1231 First National Bank Bldg., Cincinnati 2, Ohio.  
 Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.

**HONING MACHINES, Internal (Cylinder)**

Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
 Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.  
 Fulmer, C. Allen, Co., 1231 First National Bank Bldg., Cincinnati 2, Ohio.  
 Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.  
 Moline Tool Co., 102 20th St., Moline, Ill.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
 Sunnen Products Co., 7900 Manchester Ave., St. Louis 17, Mo.

**HONING STONES**

Barnes Drill Co., 814 Chestnut St., Rockford, Ill.  
 Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.  
 Fulmer, C. Allen, Co., 1231 First National Bank Bldg., Cincinnati 2, Ohio.  
 Moline Tool Co., 102 20th St., Moline, Ill.  
 Norton Co., 1 New Bond St., Worcester 6, Mass.  
 Sunnen Products Co. (Internal & External), 7900 Manchester Ave., St. Louis 17, Mo.

**HONING TOOLS AND FIXTURES**

Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
 Fulmer, C. Allen, Co., 1231 First National Bank Bldg., Cincinnati 2, Ohio.  
 Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
 Sunnen Products Co., 7900 Manchester Ave., St. Louis 17, Mo.

**HOSE, Leather, Rubber, Metallic, Etc.**

American Metal Hose Br. American Brass Co., 25 Broadway, New York, N. Y.  
 Norgren, C. A. Co., Inc., 3419 S. Elati St., Englewood, Colo.

**HYDRAULIC MACHINERY Tools and equipment**

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati Ohio.  
 Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
 Barnes Drill Co., 814 Chestnut St., Rockford, Ill.  
 Barnes, John S., Corp., Rockford, Ill.  
 Bethlehem Steel Corp., Bethlehem, Pa.  
 Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.  
 Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio.  
 Chambersburg Engrg. Co., Chambersburg, Pa.  
 Colonial Broach Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
 Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
 Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.  
 Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
 Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
 Hanson-Whitney Co., Div., Whitney Chain Co., Hartford, Conn.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.  
 Modern Ind. Engrg. Co., 14230 Birwood Ave., Detroit 4, Mich.  
 Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
 Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
 Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
 Vickers, Inc., 1402 Oakman Blvd., Detroit, Mich.  
 Watson-Stillman Co., Div., H. K. Porter Co., Inc., Roselle, N. J.  
 Wilson, K. R., 213 Mill St., Arcade, N. Y.

**HYDRAULIC POWER UNITS OR TOOL HEADS**

Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
 Barnes, John S., Corp., Rockford, Ill.  
 Barnes W. F. & John Co., 201 S. Waterford St., Rockford, Ill.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

**INDEXING AND SPACING EQUIPMENT**

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.  
 Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
 Kempsmith Machine Co., 1819 S. 71st St., Milwaukee 14, Wis.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 Nichols-Morris Corp., 76 Mamaroneck Ave., White Plains, N. Y.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
 Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 South Bend Lathe Works Inc., 425 E. Madison St., South Bend, Ind.  
 Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.  
 Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.  
 Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

(Continued on page 356)

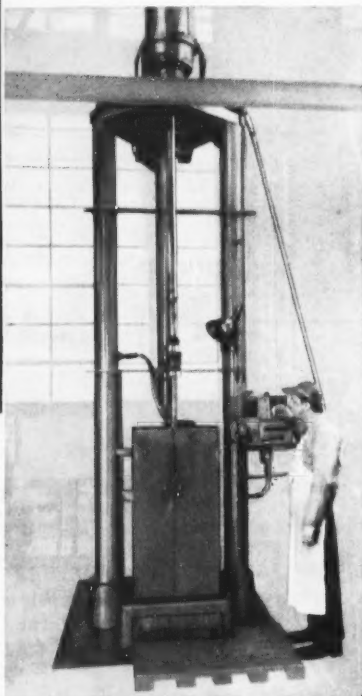
CUT AWAY  
 METAL FROM  
 INTERNAL  
 CYLINDERS  
 "MOSTEST  
 AND  
 FASTEST"  
 WITH  
**FULMER  
 HONING  
 MACHINES**

FULMER SUPPLIES  
 "EVERYTHING IN  
 ONE PACKAGE"

Honing machines . . .  
 Hones . . . Fixtures  
 . . . Tools.

**SPEED** is exact, uniform, constant, removes up to 1/16" from diameter at 1-1/2 to 2 cu. in. per min.

**ACCURACY** is achieved through self-aligning hones which remove rough spots of the internal surface and then hone the cylinder to tolerances up to .0001" (±) on ferrous and non-ferrous metals, plastics, glass, etc.

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OF FRACTIONAL HORSEPOWER GEARING

**COME TO G. S. . . YOU CAN  
DEPEND UPON THE PERFORMANCE  
OF THE BETTER GEARS WE MAKE!**

Unusual stamina and precision are qualities inherent in all G. S. Gears. Whether made to transmit the power of a rugged outboard motor or give the dependability so necessary to a vital electronic instrument, G. S. Gearing *never lets you down!* Our fast growing list of critical customers is convincing evidence of the extreme durability and uniform accuracy of these better Gears. You'll profit too, by coming to "SMALL GEAR HEADQUARTERS" for all of your needs.

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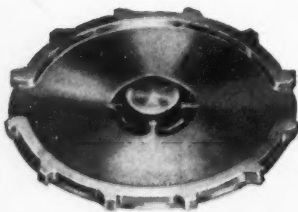
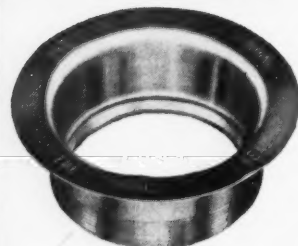
See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. This attractively printed 8½ x 11" 6-page folder is punched for ring-binder use. You'll want to keep it handy for frequent reference. It contains 23 pictures of Small Gears, plant views, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!

# MUELLER BRASS CO. forgings\* contribute to the efficiency of this modern waste disposal unit

**\*MUELLER BRASS CO. facilities include:**  
designing, die-making, forging, tooling,  
machining, polishing, plating and assembly



Three Mueller Brass Co. forgings play an important part in the fine operating performance of this modern waste disposal unit made by the Eureka-Williams Co., Division of the Henney Motor Co., Inc. This unit does a speedy and thoroughly effective job of pulverizing garbage and has made life easier for American housewives. The impeller disposer that chops up the waste food in the disposal unit, the disposer cover and the sink mounting flange are all forged by the Mueller Brass Co. This is another outstanding instance where Mueller Brass Co. forgings have improved product performance and cut costs. High quality forgings can be produced from standard and special brass, bronze and aluminum alloys. And in addition, the Mueller Brass Co. offers complete service ranging from product design to finished part . . . Write today for complete information and new 32 page forgings handbook.



1. Sink mounting flange, forged, machined, nickel and chrome plated by Mueller Brass Co.
2. Machined and finished disposer cover forging.
3. Cutting side of impeller disposer forged from 600 series bearing bronze.
4. Reverse side of impeller disposer.

## MUELLER BRASS CO.

PORT HURON 35, MICHIGAN

I-K

Product Directory

### INDICATORS, Dial

Alina Corp., 401 Broadway, New York 13, N. Y.  
Ames, B. C., Waltham 54, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Federal Products Corp., P.O. Box 1027, Providence, R. I.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Standard Gage Co., Inc., Poughkeepsie, N. Y.  
Starrett, The L. S., Co., Athol, Mass.

### INDICATORS, Speed

Brown & Sharpe Mfg. Co., Providence, R. I.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Starrett, The L. S., Co., Athol, Mass.

### INDICATORS, Test

Alina Corp., 401 Broadway, New York 13, N. Y.  
Ames, B. C., Waltham 54, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio.  
Federal Products Corp., P.O. Box 1027, Providence, R. I.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Standard Gage Co., Inc., Poughkeepsie, N. Y.  
Starrett, The L. S., Co., Athol, Mass.

### INDUCTION HEATING EQUIPMENT

General Electric Co., Schenectady, N. Y.  
Ohio Crankshaft Co., 3800 Harvard Ave., Cleveland, Ohio.

### INTENSIFIERS, Hydraulic

Baldwin-Lima-Hamilton Corp., Philadelphia 42.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
Morgan Engrg. Co., Alliance, Ohio.  
Watson-Shilman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

### JACKS, Planer

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.

### JIG BORER

See Boring Machines, Jig.

### JIGS AND FIXTURES

Allied Products Corp., 12677 Burt Rd., Detroit 23, Mich.  
Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Columbus Die, Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.  
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
Ingersoll Milling Machine Co., 2442 Douglas St., Rockford, Ill.  
Jahn, B., Manufacturing Co., Ellis St., New Britain, Conn.  
Logansport Machine Co., Inc., 810 Center Ave., Logansport, Ind.  
National Broach & Machine Co., 5600 St. Jean St., Detroit 13, Mich.  
Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.

### JOINTS

See Fittings, Hydraulic, Pneumatic, Etc.

### KEYSEATERS

Baker Bros., Inc., Station F, P.O. Box 101, Toledo 10, Ohio.  
Consolidated Mch. Tool Co., Rochester, N. Y.  
Davis Keyseater Co., 405 Exchange St., Rochester 8, N. Y.  
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.  
Mitts & Merrill, 68 Holden St., Saginaw, Mich.  
(Continued on page 358)

something new  
in **BROACHING**

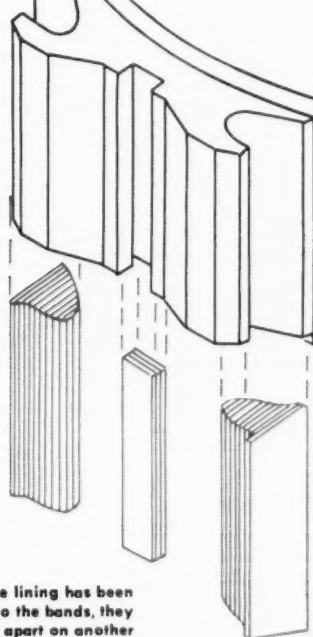
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**LAPOINTE**

**10-Ton  
54-inch Stroke**

**double ram VERTICAL BROACHING MACHINE**  
is designed to EXPAND TRANSMISSION BAND ASSEMBLIES

$\frac{3}{16}$ " in circumference, to true size and diameter,  
while at the same time **BROACHING** the area  
shown in green . . . without removing parts.



After the lining has been  
bonded onto the bands, they  
are cut apart on another  
LAPOINTE machine which  
also chamfers the lining.

PRODUCTION RATE IS 450 PARTS PER HOUR  
at 80% efficiency, removing .380" depth of stock on a  
surface. Fully push-button controlled — the operator needs  
only to load and unload the parts!

You can always keep up with the newest in broaching  
techniques, when you call on LAPOINTE! That's to be  
expected, because we've been engineering and building  
*broaching machines, tools and fixtures* for more than 52 years.

If you want more information about the job described above, write for Bulletin **TBA-DRV-1**.

**THE**

**LAPOINTE**

**MACHINE TOOL COMPANY**

MILBURN, MASSACHUSETTS • U. S. A.

*In England: Watford, Hertfordshire*

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

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Pratt & Whitney, West Hartford 1, Conn.

**KNURLING TOOLS**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Pratt & Whitney, West Hartford 1, Conn.  
Reed Rolled Thread Die Co., P.O. Box 350, Worcester 1, Mass.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**LAPPING MACHINES**

Barnes Drill Co. (Straight Line or Rotating). 814 Chestnut St., Rockford, Ill.  
Cincinnati Grinders, Inc. (Centerless), Cincinnati, Ohio.  
Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill. (Lapmaster Div.)

Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
Gleason Works, 1000 University Ave., Rochester, N. Y.  
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.  
Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.  
Norton Co., 1 New Bond St., Worcester 6, Mass.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.

**LAPPING PLATES, Hand**

Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.

**LATHE AND GRINDING DOGS**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**LATHE ATTACHMENTS**

American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio.  
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Jones & Lamson Mch., 160 Clinton St., Springfield, Vt.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Lehigh Foundries, Inc., 1500 Lehigh Dr., Easton, Pa.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.  
McCroskey Tool Corp., 1938 Thomas St., Meadville, Pa.  
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio.  
Pratt & Whitney, West Hartford 1, Conn.  
Reed Rolled Thread Die Co., P.O. Box 350, Worcester 1, Mass.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sidney Machine Tool Co., Sidney, Ohio.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Sundstrand Mch. Tool Co., Springfield, Ohio.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

**LATHE CONVERTER**

Master Mfg. Co., Hutchinson, Kansas.

**LATHES, Automatic**

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Cone Automatic Mch. Co., Inc., Windsor, Vt.  
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Goss & DeLeeuw Mch. Co., Kensington, Conn.  
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.  
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio.  
National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
Porter-Cable Machine Co., Salina St., Syracuse, N. Y.  
Potter & Johnston Co., 1027 Newport Ave., Pawtucket, R. I.  
Pratt & Whitney, West Hartford 1, Conn.  
Russell, Holbrook & Henderson, Inc., 292 Madison Ave., New York 17, N. Y.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

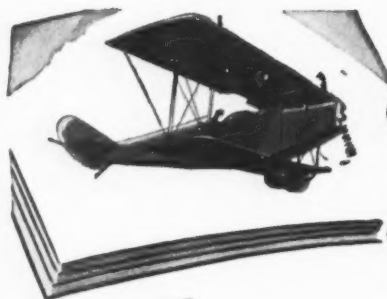
**LATHES, Axle**

Consolidated Mch. Tool Corp., Rochester, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

**LATHES, Bench**

Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Hardinge Bros., Inc., 1418 College Ave., Elmira, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Pratt & Whitney, West Hartford 1, Conn.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.

(Continued on page 362)



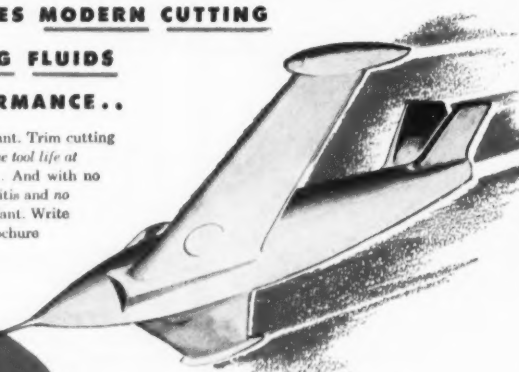
TOPS IN ITS DAY

**BUT... TODAY'S PRODUCTION MACHINERY  
REQUIRES MODERN CUTTING**

**AND GRINDING FLUIDS**

**FOR BEST PERFORMANCE..**

Trim is not just another coolant. Trim cutting and grinding fluid will increase tool life at higher rates of production... And with no rust, no gumming, no dermatitis and no STINK! Try Trim in your plant. Write for the new 40 page Trim brochure on cutting and grinding procedures.



**THE MASTER  
CUTTING AND  
GRINDING FLUID**

**TRIM** A PRODUCT OF MASTER CHEMICAL CORPORATION • 13 HURON ST. • TOLEDO 1, OHIO

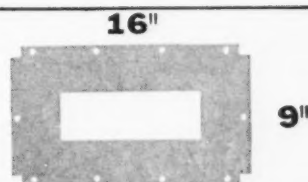


# with a WIEDEMANN you can *Reduce* INVENTORY & STORAGE SPACE!

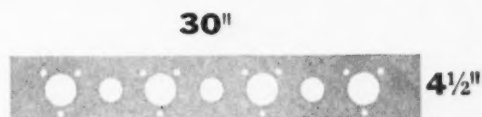
*produce parts as required.*

All  
**38**  
PIECES  
were pierced  
in  
 $\frac{1}{8}$ " mild steel  
IN  
**28**  
MINUTES  
(including  
all  
set-up)

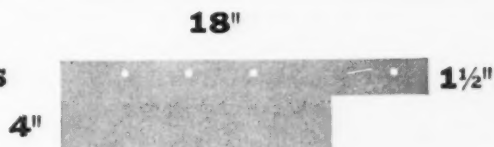
**12** LIKE THIS



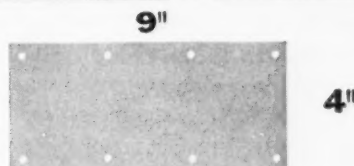
**10** LIKE THIS



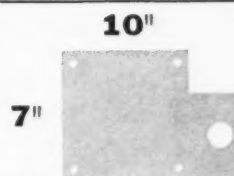
**8** LIKE THIS



**2** LIKE THIS



**6** LIKE THIS



The company producing the above parts has eliminated inventory of these and many other items; has greatly reduced inventory of punches and dies—and they no longer need to stock templates.

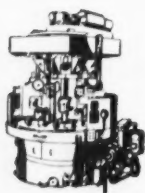
The Wiedemann method enables them to ship parts directly to assembly rather than the stockroom.

Items are produced weekly or more often if necessary. Sizes of parts pierced on the Wiedemann range from 5 ft. by 10 ft. down to 2" squares.

Inventory and storage reduction are just two of many cost-reducing features of Wiedemann Turret Punch Presses. We'll gladly make a time study on your own work.

## WIEDEMANN MACHINE COMPANY

4205 Wissahickon Avenue, Philadelphia 32, Pa.



## **BULLARD** ACCURACY IN THE MAKING

**W**HEN there's *basic* precision machining to be done, the job becomes a "natural" for the SIP Jig Borer.

A typical example is this set-up in the Bullard Company's toolroom in Bridgeport, Conn. The job is the big Ring Plate Jig used for boring and tapping cone unit holes in carriers for Bullard Contin-U-Matics. The tool that does this precision machining is the SIP HYDROPTIC-6, an extremely sensitive combination precision measuring, drilling, boring and milling machine. It provides Bullard with a guaranteed setting accuracy of 0.0002" for both the work table and the spindle head. Its time-saving economy gives Bullard still another advantage: the operator quickly sets both coordinates by means of illuminated viewing screens — easily discernible to the

naked eye at normal operating distances — which greatly magnify the images of the standard built-in table and saddle scales.

A drilling capacity of 2.375" in cast iron, a boring capacity of 12", and a 6" diameter milling cutter capacity attest to the wide range and versatility of the SIP HYDROPTIC-6. Our representative will gladly give you the whole story of SIP's priceless ingredient — *trustworthy precision for the toolroom as well as for production.*

An inquiry on your letterhead puts you under no obligation.



*for precision*

### **AMERICAN SIP CORPORATION**

100 East 42nd Street, New York 17, N. Y.

*In Canada address Rudel Machinery Company, Ltd., Montreal, Toronto, Windsor, Vancouver*



SOCIETE  GENEVOISE

*Hydroptic-6*

6.5.4

SOCIETE GENEVOISE  
GENEVE  SUISSE  
MADE IN SWITZERLAND



SOCIETE GENEVOISE

GENEVE



SUISSE

MADE IN SWITZERLAND

## NOTICE OF PATENT LICENSING

Pursuant to a consent judgment entered on the 19 day of April, 1954, in the District Court for the Eastern District of Michigan, Southern Division, in an action entitled "United States of America vs. The Cincinnati Milling Machine Company; Kearney & Trecker Corporation and Cincinnati Grinders, Incorporated", Kearney & Trecker Corporation is required in so far as it has power or authority so to do, to grant to any applicant making written request therefor a non-exclusive and unrestricted license to make, use and vend milling machines<sup>1</sup> for the life of the patent under any, some or all of the issued patents<sup>2</sup> owned or controlled by it at the date of entry of said judgment, including but not limited to those listed in an exhibit attached to said judgment without any limitation or condition, except that a reasonable and non-discriminatory royalty may be charged and collected and except that certain other limitations and conditions set forth in the judgment may be included in the license.

Upon an application being made for a license, Kearney & Trecker Corporation is obligated to advise the applicant of the royalty it deems reasonable for the patent or patents to which the application pertains. If it and the applicant are unable to agree upon what constitutes a reasonable royalty, the judgment makes provision for the fixing of the royalty rate by the court.

Reference is made to said judgment and particularly to the provisions of Section V thereof for a more detailed statement of the obligations of Kearney & Trecker Corporation. The judgment is on file in the office of the Clerk of the United States District Court for the Eastern District of Michigan, Detroit, Michigan, where it may be inspected during business hours.

Dated: June 1, 1954.

### KEARNEY & TRECKER CORPORATION

J. B. Armitage, Vice President

1 As defined in the Final Judgment, "milling machine" means (a) a power operated metal cutting machine tool which uses a rotating multi-toothed, hard metal edged cutter to shape surfaces by removing metal in the form of chips, such as, for example but not by way of limitation, machine tools of the types listed in Standard Commodity Classification Code No. 3417, published by the Munitions Board Cataloging Agency, in the 1951 revision of Directory of Metal Working Machinery and (b) devices and parts used or suitable for use therewith and attached or intended to be attached thereto, including pattern contacting mechanisms which follow and thereby automatically reproduce the shape and form of a pattern or model on a workpiece.

2 As defined in the Final Judgment, "patents" means United States Letters Patent, including reissues and extensions thereof, relating, but only in so far as they relate, to milling machines.

### LATHES, Boring

Bullard Co., Brewster St., Bridgeport 2, Conn.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.  
Sidney Machine Tool Co., Sidney, Ohio.

### LATHES, Crankshaft

Consolidated Mch. Tool Corp., Rochester, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

### LATHES, Double-End

Consolidated Mch. Tool Corp., Rochester, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

### LATHES, Duplicating

H.E.B. Machine Tools, Inc., 475 Fifth Ave., New York 17, N. Y.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.  
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio.  
Sidney Machine Tool Co., Sidney, Ohio.

### LATHES, Engine and Toolroom

American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio.  
Axelson Mfg. Co., P.O. Box 15335, Vernon Sta., Los Angeles 58, Calif.  
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.  
H.E.B. Machine Tools, Inc., 475 Fifth Ave., New York 17, N. Y.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.  
Logan Engrg. Co., 4901 W. Lawrence Ave., Chicago 30, Ill.  
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio.  
Morey Machinery Co., Inc., 383 Lafayette St., New York 17, N. Y.  
Nebel Machine Tool Co., 3401 Central Parkway, Cincinnati 25, Ohio.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.  
Sidney Machine Tool Corp., Sidney, Ohio.  
Simmons Machine Tool Corp., 1600 N. Broadway, Albany, N. Y.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
Springfield Mch. Tool Co., Springfield, Ohio.

### LATHES, Gap

Axelson Mfg. Co., P.O. Box 15335, Vernon Sta., Los Angeles 58, Calif.  
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
H.E.B. Machine Tools, Inc., 475 Fifth Ave., New York 17, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.  
Nebel Machine Tool Co., 3401 Central Parkway, Cincinnati 25, Ohio.

Seneca Falls Mch. Co., Seneca Falls, N. Y.  
Sidney Machine Tool Co., Sidney, Ohio.  
Springfield Mch. Tool Co., Springfield, Ohio.  
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

### LATHES, Gun

Consolidated Mch. Tool Corp., Rochester, N. Y.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.  
Seneca Falls Mch. Co., Seneca Falls, N. Y.

### LATHES, Hollow Spindle

Axelson Mfg. Co., P.O. Box 15335, Vernon Sta., Los Angeles 58, Calif.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.  
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.

### LATHES, Manufacturing Type

Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y.  
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

### LATHES, Spinning

Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio.  
Ferracute Machine Co., Bridgeton, N. J.

### LATHES, Toolroom

See Lathes, Engine and Toolroom.

### LATHES, Turret

Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Hardinge Brothers, Inc., (Bench or Cabinet Mounting), 1418 College Ave., Elmira, N. Y.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.  
Millholland, W. K., Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind.  
Morey Machinery Co., Inc., 383 Lafayette St., New York, N. Y.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Potter & Johnston Co. (Automatic), 1027 Newport Ave., Pawtucket, R. I.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.  
South Bend Lathe Works, 425 E. Madison St., South Bend, Ind.  
Springfield Mch. Tool Co., Springfield, Ohio.  
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

### LATHES, Vertical Turret

American Steel Foundries, King Mch. Tool Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Bullard Co., Brewster St., Bridgeport 2, Conn.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.

### LAYOUT FLUID

Dykem Co., 2303 P. North 11th St., St. Louis 6, Mo.

### LEVELS

Bullard Co., Brewster St., Bridgeport 2, Conn.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Millers Falls Co., Greenfield, Mass.  
Pratt & Whitney, West Hartford 1, Conn.  
Starrett, The L. S. Co., Athol, Mass.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.

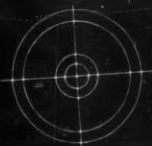
(Continued on page 364)





## Turning

Tool tips on multiple-tool setup, turning SAE 1050 axles in as-forged condition. Best competitive steel: 6 to 7 axles per grind per set. VASCO SUPREME gives 15 axles per grind per set of tools on same job.

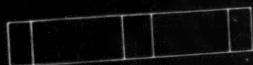


## Boring

Boring bits, on axle hole of SAE 1060 car wheels, as forged, hardness BHN 255. Competitive steels gave 20 wheels per grind. VASCO SUPREME averages 40 wheels per grind on this assignment.

VASCO

# SUPREME



## Milling

Shell end mills, on 30" diameter cams for carpet looms. Regular high speed steels produced 6 cams on first grind—gave 1 to 2 regrinds. VASCO SUPREME produces 14 cams on first grind, permits 3 regrinds before too small.



## Threading

A unique job for a unique steel. Glass pulling roll 16 feet long, Rockwell "C" hardness 66-68, required highly-polished finished thread (28/inch) throughout length, with diameter tolerance of .0005". VASCO SUPREME tool cut thread 2605 feet long without regrinding, to tolerance of .0005"—one of the most remarkable performances ever recorded.

for

## supreme performance

## in high speed steels

specify and use

These instances of SUPREME cutting efficiency, taken at random from current report files, typify the unparalleled service to industry provided by this extraordinary High Speed Steel. VASCO SUPREME will do work no other high speed steel will do. It is often used with cemented carbide tools—and at far less cost. And there are applications where *only* VASCO SUPREME's unique combination of strength and toughness will do the job as it should be done. *Write us about your present needs.*

### VANADIUM-ALLOYS STEEL COMPANY

*Manufacturers of First Quality Tool and Die Steels*

**Lafayette, Pennsylvania**

COLONIAL STEEL DIVISION • ANCHOR DRAWN STEEL CO.



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The introduction of LUBRIPLATE Lubricants established a new high standard for industrial lubrication. Now, a recently patented improvement in the production of LUBRIPLATE results in even greater lubrication efficiency. Under today's operating costs, reduction of down time, less parts wear and replacements, as well as lower power consumption, far outweigh any differential in the initial cost of LUBRIPLATE Lubricants.

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**LUBRIPLATE DIVISION**  
Fiske Brothers Refining Co.  
Newark 5, N. J. • Toledo 5, Ohio



364—MACHINERY, June, 1954

### LOCKNUTS

Link-Belt Co. (For Positioning Bearings), 519 N. Holmes Ave., Indianapolis 6, Ind.

### LUBRICANTS, Including Extreme Pressure (EP) Machinery Lubricants

Cities Service Oil Co., 70 Pine St., New York, N. Y.  
Houghton, E. F. & Co., 303 W. Lehigh Ave., Philadelphia, Pa.  
Lubriplate Div., Fiske Bros. Refining Co., 120 Lockwood St., Newark 5, N. J.  
Shear-Speed Chem. Prod. Div., Michigan Tool Co., 7125 E. McNichols Rd., Detroit 12, Mich.  
Sinclair Refining Co., 600 5th Ave., New York, N. Y.  
Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, Ill.  
Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St., Chicago 23, Ill.  
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.  
Texas Co., 135 E. 42nd St., New York, N. Y.

### LUBRICATING SYSTEMS

Farval Corp., 3249 E. 80th St., Cleveland, Ohio.  
Madison-Kipp Corp., Madison, Wis.  
Norgren, C. A. Co., Inc., 3419 S. Elati St., Englewood, Colo.  
Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

### MACHINE KEYS

Gillen, John, Co., Inc., 2540 S. 50th Ave., Cicero 50, Ill.

### MACHINE PARTS, Special

Gillen, John, Co., Inc., 2540 S. 50th Ave., Cicero 50, Ill.

### MACHINISTS' SMALL TOOLS

See Calipers, Hammers, Wrenches, Drills, Taps, Etc.

### MANDRELS

See Arbors and Mandrels.

### MARKING MACHINES AND DEVICES

Colonial Broach Co., P.O. Box 37, Harper Sta., Detroit, Mich.

### MEASURING MACHINES AND INSTRUMENTS, Precision

Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio.  
Crone Parking Co., 1800 Cuyler Ave., Chicago.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Federal Products Corp., P.O. Box 1027, Providence, R. I.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Norma-Hoffman Bearings Corp., Stamford, Conn.  
Pratt & Whitney, West Hartford 1, Conn.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Sheffield Corp., 721 Springfield, Dayton, Ohio.  
Starrett, The L. S. Co., Athol, Mass.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass.

### MEASURING WIRES, THREAD, SPLINE AND GEAR

Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.

### METAL, Bearings

See Bearings, Bronze, Babbitt, Etc., and Bushings, Brass, Bronze, Etc.

### METERS

See Recording instruments.

### MICROMETERS

Alina Corp., 401 Broadway, New York 13, N. Y.  
Ames, B. C. Co. (Dial), Waltham 54, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Millers Falls Co., Greenfield, Mass.  
Pratt & Whitney, West Hartford 1, Conn.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Starrett, The L. S. Co., Athol, Mass.  
Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass.

### MICROSCOPES, Toolmakers

DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

### MILLING ATTACHMENTS

Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling Machine Co., Cincinnati  
Consolidated Machine Tool Corp., Rochester, N. Y.  
Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Kempson Machine Co., 1819 S. 71st St., Milwaukee 14, Wis.  
Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.  
Pratt & Whitney, West Hartford 1, Conn.  
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass.  
Van Norman Co., 3640 Main St., Springfield 7, Mass.

### MILLING AND CENTERING MACHINES

Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.  
Jones & Lamson Mch. Co. (Automatic), 160 Clinton St., Springfield, Vt.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

### MILLING MACHINES, Automatic

Cincinnati Milling Machine Co., Cincinnati, Ohio.  
Consolidated Machine Tool Corp., Rochester, N. Y.  
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

### MILLING MACHINES, Bench

Barker Engrg. Co., 500 Green Rd., Cleveland 21, Ohio.  
Hardinge Bros., Inc. (Bench or Pedestal Type), 1418 College Ave., Elmira, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.

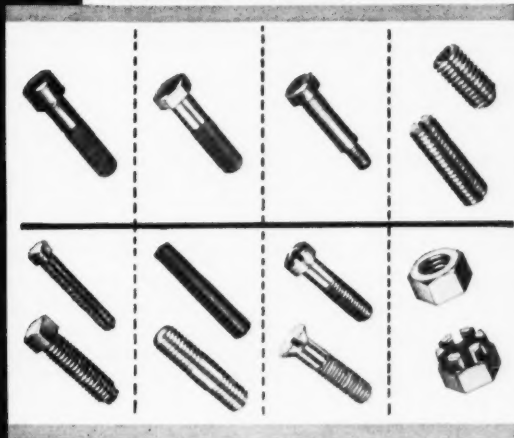
### MILLING MACHINES, Circular Continuous

Consolidated Machine Tool Corp., Rochester, N. Y.  
Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.  
Espin-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

(Continued on page 366)

*Cut*

## Assembly and Production Costs with "CHICAGO" Standard Threaded Products



For whatever purpose, production or maintenance, "Chicago" Threaded Products for 82 years have been precision made to assemble faster with less "on the job" trouble.

Specify standard sizes for faster deliveries, greater savings over "specials" and less downtime. Our more complete stocks mean "at once" shipments when you need them—no production delays—no maintenance "shut downs"—no large inventories necessary.

The "Chicago" line of threaded products is a complete line, available from the stocks of your service-conscious Industrial Supply dealer—in bulk or in packages for original equipment or replacement. Ask him for samples—he will gladly supply them.



This new 36-page catalog tells the whole story of the "Chicago" complete line of threaded products. Ask for your copy today.

All "Chicago" Screw Products come packed in strong, easier-to-see packages. Color coded labels mean faster selection, greater savings of time in your stock-rooms.



### HIGHLIGHTS OF THE "CHICAGO" LINE:

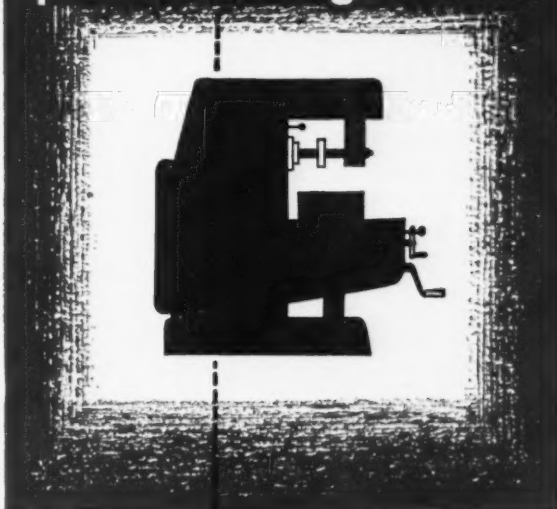
- ★ High Carbon Heat Treated Cap Screws give added wearing qualities due to uniform hardness through entire thread structure. Ideal for all heavy-duty equipment.
- ★ Larger size Hexagon Head Cap Screws than normally stocked are available for immediate shipment.
- ★ Anti-corrosive "Chicago" stainless steel and brass fasteners in a large range of sizes and styles available for immediate shipment.

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**SCREW COMPANY**

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"SAFETY PLUS" Socket Set Screws, alloy and stainless • Socket Head Cap Screws, alloy and stainless, Flat Head, alloy • Socket Head Stripper Bolts • Socket Pipe Plugs • Square Head Dog Point Set Screws • Socket Keys and Key Kits • "CHICAGO" Hexagon Head Cap Screws, bright, heat treated, stainless and brass • Square Head and Headless Set Screws • Fillister and Flat Head Cap Screws • Milled Steel Studs • Hexagon Nuts, steel and brass • Castle Nuts • Taper Pins

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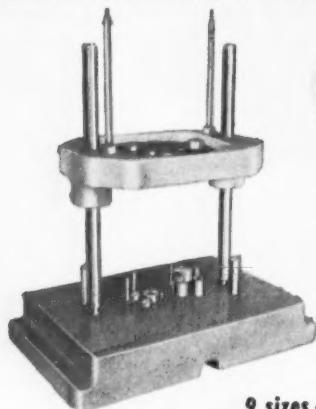
*Columbus Die-Tool*  
**AND MACHINE COMPANY**

P. O. BOX 750 • COLUMBUS, OHIO  
ESTABLISHED 1906

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JIGS • FIXTURES • BUILDING MACHINE TOOLS COMPLETE  
SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

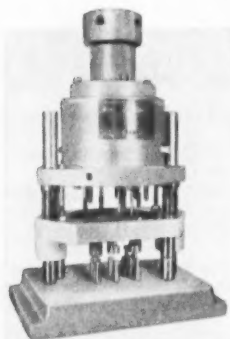


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9 sizes —  
5 combinations per size — for  
hole patterns 3" through 15" dia.

Standardization makes for quick delivery and attractive price. Only a few minor parts need be made. Speed up machining operations. The operator merely feeds the parts — the Zagar Self-clamping Drill Jig does the rest. Zagar drill jigs are now "off the shelf".



Zagar drill jigs can be used in conjunction with Zagar gearless multiple-spindle drill heads to ream, drill, and tap on standard drill presses and tapping machines. Or, Zagar can quickly supply the complete "package" unit.

Write for new Bulletin "M-6".

**ZAGAR TOOL, INC.**  
24000 LAKELAND BLVD., CLEVELAND 23, O.



366—MACHINERY, June, 1954

## **MILLING MACHINES, Duplex**

Cincinnati Milling Machine Co., Cincinnati, Ohio.  
Consolidated Machine Tool Corp., Rochester, N. Y.  
Esper-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Nichols-Morris Corp., 76 Mamaronck Ave., White Plains, N. Y.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

## **MILLING MACHINES, Hand**

Barker Engrg. Co., 500 Green Rd., Cleveland 21, Ohio.  
Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.  
Nichols-Morris Corp., 76 Mamaronck Ave., White Plains, N. Y.  
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.  
Van Norman Co., 3640 Main St., Springfield 7, Mass.

## **MILLING MACHINES, Horizontal, Plain and Universal**

Austin Industrial Corp., 76 Mamaronck Ave., White Plains, N. Y.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling Machine Co., Cincinnati, Ohio.  
Consolidated Machine Tool Corp., Rochester, N. Y.  
Cosa Corp., 405 Lexington Ave., New York 17, Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine Wis.  
Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Kemp Smith Machine Co., 1819 S. 71st St., Milwaukee 14, Wis.  
Marac Machinery Corp., 45 So. Broadway, Yonkers, N. Y.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Sheldon Machine Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.  
Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
Van Norman Co., 3640 Main St., Springfield 7, Mass.

## **MILLING MACHINES, Lincoln Type**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

## **MILLING MACHINES, Planer Type**

Consolidated Mch. Tool Corp., Rochester, N. Y.  
Esper-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.  
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Gray, G. A., Co., Woodburn Ave. and Penn. R. R. Evanston, Cincinnati, Ohio.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Pratt & Whitney, West Hartford 1, Conn.

## **MILLING MACHINES, Profile**

Cincinnati Milling Machine Co., Cincinnati, Ohio.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.  
Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

## **MILLING MACHINES, Ram Type Universal**

Van Norman Co., 3640 Main St., Springfield 7, Mass.

## **MILLING MACHINES, Turret Type**

Bridgeport Machines, Inc., Linley Ave., Bridgeport, Conn.

## **MILLING MACHINES, Vertical**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Cincinnati Milling Machine Co., Cincinnati, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Ekstrom, Carlson & Co., 1437 Railroad Ave., Rockford, Ill.  
Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.  
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
Kearney & Trecker Corp., Milwaukee, Wis.  
Marac Machinery Corp., 45 So. Broadway, Yonkers, N. Y.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

## **MODEL AND EXPERIMENTAL WORK** See Special Machinery and Tools.

## **MOLD AND DIE COPYING MACHINES**

Cosa Corp., 405 Lexington Ave., New York 17, Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.  
Pratt & Whitney, West Hartford 1, Conn.

## **MOLDING MACHINES, Plastic**

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
Rockford Machine Tool Co., 2500 Kiswaukee St., Rockford, Ill.  
Watson-Stillman Co., Div., H. K. Porter Co., Inc., Roselle, N. J.

## **MOTORS, Electric**

Delco Products Div., General Motors Corp., 321 E. First St., Dayton, Ohio.  
General Electric Co., Schenectady, N. Y.  
Howell Electric Motor Co., Howell, Mich.  
Reliance Electric & Engrg. Co., 1074 Ivanhoe Rd., Cleveland 10, Ohio.

## **MOTORS, Hydraulic**

Gerator May Corp., Oliver St. and Maryland Ave., Baltimore, Md.  
Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

## **MULTIPLE-SLIDE FORMING MACHINES**

U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

## **NIBBLING MACHINES**

Campbell Machine Div., American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport, Conn.

## **NIBBLING MACHINES, Nickel**

International Nickel Co., Inc., 67 Wall St., New York, N. Y.  
Wales-Strippet Corp., N. Tonawanda, N. Y.

## **NIPPLE THREADING MACHINERY**

Landis Machine Co., Inc., Waynesboro, Pa.

## **NUT MAKING MACHINERY**

National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.

(Continued on page 368)

For more information on products advertised, use Inquiry Card, page 245



WHAT DOES FIRTH STERLING OFFER YOU?

(ANSWER NUMBER 4)

# RESEARCH THAT ANTICIPATES TOMORROW'S NEEDS

Our objective is to help *you* solve the technical and metallurgical problems of an *atomic* age *before* they arise . . . not *after*. So, at Firth Sterling, constant emphasis is on full-scale research, development, and production in specialty steels, carbides, new metals, and new methods.

Out of this determination to be ahead, not just abreast of need, has come this amazing three year record of achievement in *your* interest:

- A method of heat tinting that makes *Color Metallography* practical for determining the exact structure-property relationship of carbide mixtures.\*
- New metals of great present and future potential that include heavy metal, three grades of chromium carbide, titanium carbide, and high temperature alloys.
- Cermets—those amazing hybrids of ceramic and metal, possessing in *combination* the best characteristics of each, to overcome modern technological problems.
- Zirconium—in ingot, billet, bar, rod, strip, sheet, wire, and tubing form—soon to be available for industrial applications.
- A new chemical plant, employing the most advanced processes and equipment, producing ammonium paratungstate of the highest *purity* to improve the quality of our tungsten carbides.
- Method "X"—an electro-mechanical process for machining metals that are unmachinable by conventional means.

Yes, all these are the result of "accent on research" . . . the justification for our statement

**Firth Sterling Stands for Metallurgical Achievement—Past, Present, Future**

\*Write for reprint of article from Oct. 19, 1953 issue of STEEL.

## **Firth Sterling**

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

OFFICES\* AND WAREHOUSES: BIRMINGHAM\* CHICAGO CLEVELAND DAYTON\* DETROIT HARTFORD  
HOUSTON\* LOS ANGELES NEW YORK\* PHILADELPHIA\* PITTSBURGH\* WASHINGTON\* WESTFIELD, N.J.\*

For more information on products advertised, use Inquiry Card, page 245

GET THE FIRTH STERLING

## "Packaged Line"

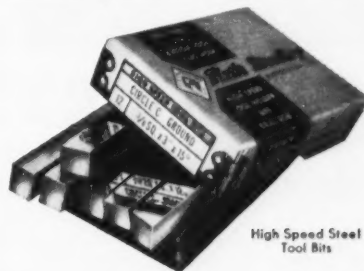
FOR COMPLETE SHOP TOOLING

If they were jewels, instead of tools, they couldn't be packaged with more thought for distributors' and users' needs. Tough, corner-reinforced cardboard or reusable



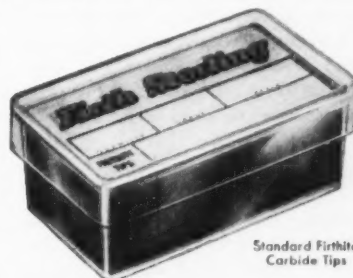
Standard Firthite Carbide Tools

plastic containers for maximum protection. End or top marked with contents for quick, accurate selection. Boxed in standard quantities. Easy to handle,



High Speed Steel Tool Bits

stock, identify, inventory. Yes, the Firth Sterling packaged tool line has these advantages for distributor and user alike.



Standard Firthite Carbide Tips

But more, both high speed *steel* and Firthite *carbide* tools are available, to assure choice of the right tools for every job . . . from stock, from *one* dependable source!

P-2

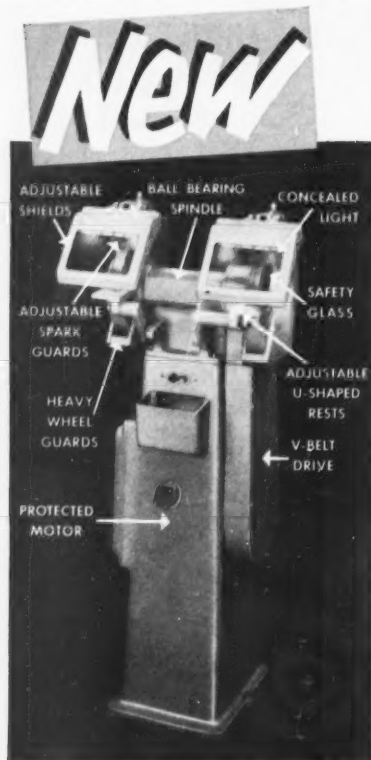
PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels  
Tool & Die Steels  
Stainless Specialties  
High Temperature Alloys



Sintered Tungsten Carbides  
Firth Heavy Metal  
Chromium Carbides  
High Temperature Cermets

MACHINERY, June, 1954—367



## SOUTH BEND Pedestal GRINDER

A ruggedly built grinder that will give long, dependable service under hard use. Ideal for rough or precision grinding. The motor is enclosed in the pedestal and drives through a V-belt. This removes the weight of the grinding wheels from the motor bearings and practically eliminates vibration. Moreover, it isolates the motor from abrasive dust and provides greater work clearance.

### SPECIFICATIONS

**Wheel Size:** 8" dia. ( $\frac{1}{2}$  h.p. motor), 10" dia. ( $\frac{3}{4}$  h.p. motor).

**Spindle:** Approximate speed 2450 r.p.m. Sealed ball bearings.

**Motor:** Standard 2875 r.p.m. 50 cycle or 3450 r.p.m. 60 cycle. Also D. C.

**Over-all Dimensions:** 49 $\frac{1}{2}$ " high, 18" wide, 20 $\frac{1}{2}$ " deep (10" Grinder  $\frac{1}{2}$ " wider).

8" — \$245.00; 10" — \$248.00 each less motor and remote control equipment. Time terms: 10% down — balance in 12 months. f.o.b. factory.

**SOUTH BEND LATHE**

SOUTH BEND 22, INDIANA



Building Better Tools Since 1906

**South Bend MACHINE TOOLS**

### NUT SETTING EQUIPMENT

See Screw Driving and Nut Setting Equipment.

### NUT TAPPERS

See Bolt and Nut Machinery.

### NUTS, Cold Forged, Wing and Cap

Chicago Screw Co., Bellwood, Ill.  
Parker-Kalon Div., General American Transportation Corp., 200 Varick St., New York, N. Y.  
Republic Steel Corp., (Union Drawn Steel Div.), Republic Bldg., Cleveland 1, Ohio.  
Union Drawn Steel Co., Div., Republic Steel Corp., Massillon, Ohio.

### NUTS, Self-locking

Grip Nut Co., 310 S. Michigan Ave., Chicago 4, Ill.

### NUTS, Thumb or Wing and Cap

Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y. (Stainless Steel only)  
Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.  
Republic Steel Corp., Bolt and Nut Div., Republic Bldg., Cleveland 1, Ohio.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

### OIL CUPS

Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, Ill.

### OIL EXTRACTORS AND CLEANERS

De Laval Separator Co., Poughkeepsie, N. Y.

### OIL GROOVERS

Fischer Machine Co., 310 No. 11th St., Philadelphia, Pa.  
Wicaco Machine Co., Stenton Ave. and Loudon St., Philadelphia, Pa.

### OIL-HOLE COVERS

Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, Ill.

### OIL SEALS

Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill.  
Garlock Packing Co., Palmyra, N. Y.

### OILERS AND LUBRICATORS

Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, Ill.  
Madison-Kipp Corp., Madison, Wis.  
Norgren, C. A. Co., Inc., 3419 S. Elati St., Englewood, Colo.

### OILS, Cutting

See Cutting and Grinding Fluids.

### OILS, Lubricating

Cities Service Oil Co., 70 Pine St., New York, N. Y.  
Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia, Pa.  
Sinclair Refining Co., 600 5th Ave., New York  
Standard Oil Co., (Indiana), 910 S. Michigan, Chicago, Ill.  
Stuart Oil Co., Ltd., D. A., 2739 S. Troy St., Chicago 23, Ill.  
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.  
Texas Co., 135 E. 42nd St., New York, N. Y.

### OILS, Quenching and Tempering

Cities Service Oil Co., 70 Pine St., New York, N. Y.  
Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia, Pa.  
Sinclair Refining Co., 600 5th Ave., New York  
Standard Oil Co., (Indiana), 910 S. Michigan, Chicago, Ill.  
Stuart Oil Co., Ltd., D. A., 2739 S. Troy St., Chicago 23, Ill.

### OILS, Soluble

See Compounds, Cutting, Grinding, Metal Drawing, Etc.

### OPTICAL FLATS

Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill.  
Scherer, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

### ORDNANCE MACHINES, Spial

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Rehnberg-Jacobson Mfg. Co., 2135 Kiskadee St., Rockford, Ill.  
Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.

### PACKING, Leather, Metal, Rubber, Asbestos, Etc.

Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill.  
Garlock Packing Co., Palmyra, N. Y.  
Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia, Pa.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

### PAINTING EQUIPMENT, Spray

Lowe Bros. Co., Dayton, Ohio.

### PARALLELS

Brown & Sharpe Mfg. Co., Providence, R. I.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Starrett, The L. S. Co., Athol, Mass.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
Walker, O. S., Co., Inc., Worcester, Mass.

### PATTERNS, Wood and Metal

Mummert-Dixon Co., Hanover, Pa.

### PILLOW BLOCKS

Boston Gear Works, 3200 Main St., North Quincy 71, Mass.  
Link-Belt Co., 519 N. Holmes Ave., Indianapolis 6, Ind.  
Norma-Hoffman Bearings Corp., Stamford, Conn.  
Standard Pressed Steel Co., Jenkintown, Pa.

### PIPE, BRASS AND COPPER

American Brass Co., 25 Broadway, New York, N. Y.  
Mueller Brass Co., Port Huron 35, Mich.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

### PIPE STEEL

Alleghany Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
United States Steel Corp., National Tube Co., Div., 436 7th Ave., Pittsburgh, Pa.

### PIPE THREADING AND CUTTING MACHINES

Landis Machine Co., Inc., Waynesboro, Pa.

### PIPE TONGS

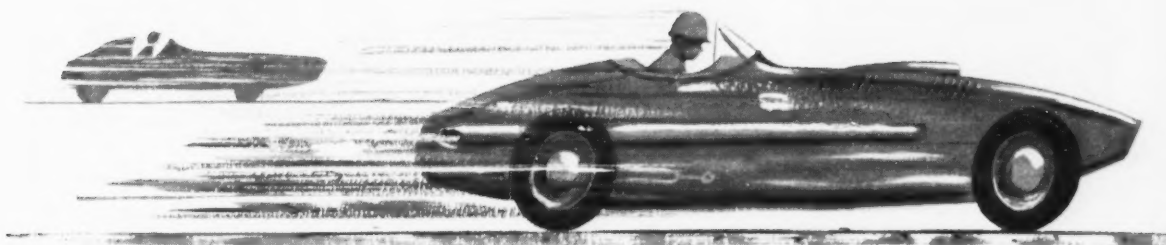
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

### PLANNER ATTACHMENTS

Consolidated Mch. Tool Corp., Rochester, N. Y.  
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Gray, G. A., Co., Woodburn Ave. and Penn R. R., Evanston, Cincinnati, Ohio.  
Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.  
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.

(Continued on page 372)

# FOR *High Speed* MACHINING



## ... YOU NEED **ANTISEP**

Like racing cars, metal cutting machinery and tools are built for higher speeds today than ever before. But to get all the metal cutting speed your equipment can give, you need a modern, high-speed coolant—Antisep A. P. Base!

Antisep is a heavy-duty, fortified cutting base—soluble in water—that has greater lubricity and carries away heat faster than any cutting fluid you can match against it. It has excellent anti-welding properties and is treated to eliminate rancidity and odor.

Take advantage of the profitable production speed of your machines by using Antisep. For a trial production run in your own shop, call your Houghton Man or write E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.



### MACHINING SPEED

RAISED FROM ONE PART EVERY  
SIX MINUTES TO ONE  
PART EVERY 3.16 MINUTES!

An East Coast machine shop operator practically doubled the speed of his machining operations when he switched to Antisep. He got longer tool life and more satisfactory all-round performance, too.

## ANTISEP

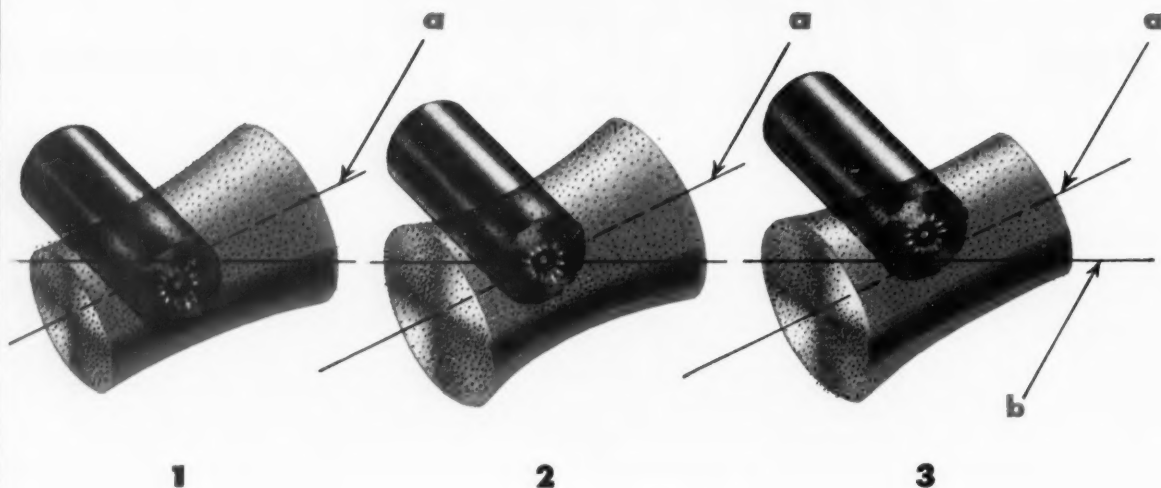
THE HEAVY-DUTY, WATER-SOLUBLE  
CUTTING BASE

... a product of

**E. F. HOUGHTON & CO.**  
PHILADELPHIA - CHICAGO - DETROIT - SAN FRANCISCO



Ready to give you on-the-job service . .



**misalignment is expensive**

## ...Bryant controlled alignment

USERS of internal grinders generally believe that once the grinding wheel passes the diamond, the form of the wheel will be a perfect cylinder and this wheel will then grind a straight hole. If the wheelhead is tipped so that its center line is not parallel with the motion of the longitudinal ways, the wheel cannot be trued to a perfect cylinder. In our illustration each wheel is tipped as it passes the diamond. Even though the diamond describes a straight line across the surface of the tipped wheel, the wheel will not be trued to a perfect cylinder. This is because the wheel is not being moved on a path along its own center line. When the wheel is tipped so that its center line "a" does not coincide with its direction of travel "b" as the wheel passes the diamond, an apparent taper "1" or "3", or an hour-glass "2" will be generated on the wheel. The vertical position of the diamond determines which one of these three forms will be produced on a tipped wheel. In this case we have two variables; that is, the wheel axis "a" may not coincide with its direction of travel "b", and the diamond may be above or below center.



*Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie—free showings arranged for engineering groups.*





This No. 2209 Bryant Internal Grinder is equipped for shoe centerless internal grinding. It is especially useful in applications where close tolerances are required for concentricity, bore roundness and squareness where previous O. D. and face grinding operations have been closely controlled. The No. 2209 can accommodate workpieces from 1" to 3½" O. D. The machine cycle is fully automatic and is controlled by a combination of cams and levers. The left end of the workhead can be raised or lowered to bring its axis into a plane parallel with the wheel slide bar. The rear of the wheel slide can be adjusted to insure straight line motion of the wheel. Loading can be automatic or manual. Write for folder.

## gives better internal grinding

Taper due to tipping of the wheel can be identified by raising or lowering the diamond. If the wheel is tapered as in "1" and after raising the diamond the form changes to "2" and again, after raising the diamond, the taper changes to "3", the front of the wheel (left end in illustration) is low and the wheel is tipped down. On the other hand, if the small diameter of the taper moves from right to left on the wheel as the diamond is progressively raised, the front of the wheel is tipped up.

An error in wheel form similar to those illustrated cannot produce a good hole either for size or shape, since there can be no straight line of contact for the full length of the wheel and the full length of the work as the wheel traverses. Furthermore, this distortion in the form of the wheel cannot be eliminated by simply turning the workhead. The remedy is to correct the alignment by bringing the wheel center line parallel with the wheel path (direction of wheel travel) and to the same height as the workhead center line, and setting the diamond in the plane established by the wheelhead and workhead center lines.

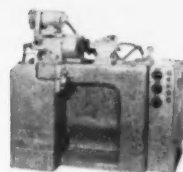
see our catalog in  
MACHINE  
TOOL  
CATALOGS  
or write for copy

### Bryant Chucking Grinder Co.

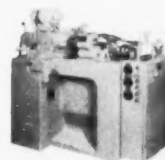
Springfield, Vermont, U. S. A.

Internal Grinders • Boring Machines • Internal & External Thread Gages • Granite Surface Plates

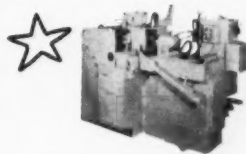
For more information on products advertised, use Inquiry Card, page 245



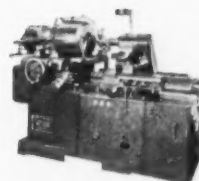
no. 1109 9" swing, semi-automatic



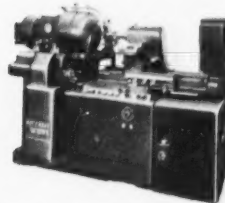
no. 1309-W 9" swing, 2 spindle  
semi-automatic



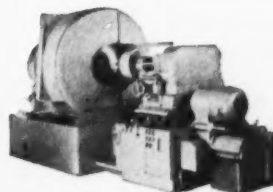
no. 2209 9" swing, automatic



no. 1116 16" swing, semi-automatic



no. 3216 16" swing, automatic



no. 1460 60" swing,  
semi-automatic

**Welded steel points the way  
for the product engineers who**

## WANT TO CUT PRODUCT COSTS 50%

### Proper Design in Welded Steel is Always Lower in Cost

**Material Cost is Less**—It's a fact . . . steel is three times stronger than iron, two and a half times as rigid. Where strength alone is needed, one-third the metal is necessary. When rigidity is important, less than half the material is required. But steel costs only one-third as much per pound. Steel is more easily placed where it can carry more load per pound of metal. As a result, ultimate savings with steel are limited only by the resourcefulness of the designer.

**Manufacture is Simpler**—Fewer man-hours . . . simpler, less costly production tools are needed to manufacture products from steel. By proper design, many operations needed for machining castings can be eliminated entirely. Assembly operations can be simplified . . . finishing and cleaning manhours reduced substantially.

Products designed in steel have a modern appearance to improve selling appeal while reducing costs on an average of 50% according to field reports.



**Welded Design Saves 50% on motor gear housing.** Original cast construction weighed 175% more . . . required 90% more machining.



**Cost Down 57% on machine stand by change to welded steel.** Also eliminates former milling and drilling on former castings.

#### HOW TO START A COST REDUCTION PROGRAM

Your Lincoln Representative is a specialist in welded design. We will gladly assist your engineers in restudying designs to determine where and how welded steel can save an average of 50% in the manufacture of your products. Call or write.

*Design Bulletins also available to product engineers by writing on your letterhead to*

#### THE LINCOLN ELECTRIC COMPANY

DEPT. CLEVELAND 17, OHIO

#### PLANERS, Double Housing and Openside

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio (Plate).  
Consolidated Mch. Tool Corp. (Incl. Plate, Rotary and Crank Types), Rochester, N. Y.  
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
Gray, G. A., Co., Woodburn Ave. and Penn R. R., Evanston, Cincinnati, Ohio.  
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.

#### PLATE ROLLS

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.  
Bethlehem Steel Co., Bethlehem, Pa.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.

#### PLATES, Surface

Brown & Sharpe Mfg. Co., Providence, R. I.  
Challenge Machinery Co., Grand Haven, Mich.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Pratt & Whitney Div., West Hartford 1, Conn.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.  
Vince Corp., 9113 Schaefer Highway, Detroit 28, Mich.

#### PNEUMATIC EQUIPMENT

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.  
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Lehigh Foundries, Inc., 1500 Lehigh Dr., Easton, Pa.  
Logansport Machine Co., Inc., 810 Center Ave., Logansport, Ind.  
Mead Specialties Co., 4114 North Knox Ave., Chicago 41, Ill.  
Norgren, C. A., Co., Inc., 3419 S. Elati St., Englewood, Colo.  
Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.

#### POLISHING LATHES AND MACHINES

Black & Decker Mfg. Co., Penna. Ave., Towson, Md.  
Gardner Machine Co., (Div. Landis Tool Co.), 414 E. Gardner St., Beloit, Wis.  
Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo 54, Mich.  
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Millers Falls Co., Greenfield, Mass.  
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

#### POLISHING TOOLS, Portable

Jarvis, Charles L., Co., Middletown, Conn.  
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

#### POWER UNITS, Hydraulic

See Hydraulic Power Units or Tool Heads

#### PRESSES, Air

Fanco Machine Co., 3134 Sheridan Rd., Kenosha, Wis.

#### PRESSES, Arbor

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.  
Dake Engine Co., 604 Seventh St., Grand Haven, Mich.  
Fanco Machine Co., 3134 Sheridan Rd., Kenosha, Wis.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago.  
Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
Logansport Machine Co., Inc., 810 Center Ave., Logansport, Ind.  
Tomkins-Johnson Co., 614 No. Mechanic St., Jackson, Mich.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.  
Wilson, K. R., 213 Mill St., Arcade, N. Y.

#### PRESSES, Broaching

American Broach & Mch. Co., Ann Arbor, Mich.  
Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.  
Colonial Broach Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
Dake Engine Co., 604 Seventh St., Grand Haven, Mich.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
Ferracute Machine Co., Bridgeton, N. J.  
Lake Erie Engrg. Co., Kenmore Station, Buffalo, N. Y.  
Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.  
Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

#### PRESSES, Extrusion

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati.  
Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
Lake Erie Engrg. Co., Kenmore Station, Buffalo, N. Y.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

#### PRESSES, Foot

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.  
Fanco Machine Co., 3134 Sheridan Rd., Kenosha, Wis.  
Ferracute Machine Co., Bridgeton, N. J.  
Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.

#### PRESSES, Forging

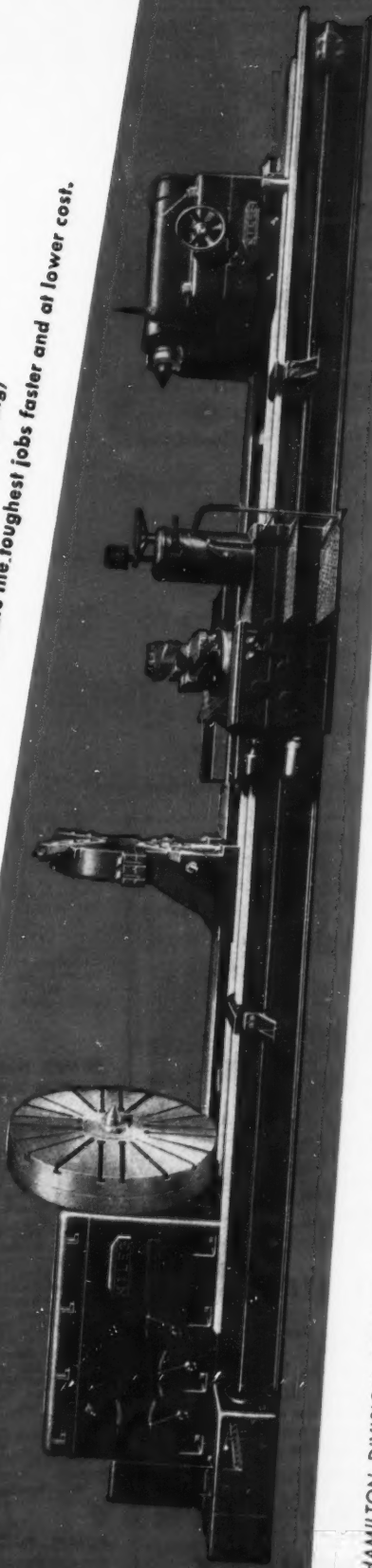
Ajax Mfg. Co., Euclid, Cleveland 17, Ohio.  
American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.  
Bethlehem Steel Co., Bethlehem, Pa.  
Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.  
Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.  
Dake Engine Co., 604 Seventh St., Grand Haven, Mich.  
Erie Foundry Co., Erie, Pa.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.  
Ferracute Machine Co., Bridgeton, N. J.  
Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.  
Morgan Engrg. Co., Alliance, Ohio.  
National Mchry. Co., Greenfield and Stanton Sts., Tiffin, Ohio.  
Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, Ill.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.  
Wilson, K. R., 213 Mill St., Arcade, N. Y.  
Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J.

#### PRESSES Hydraulic

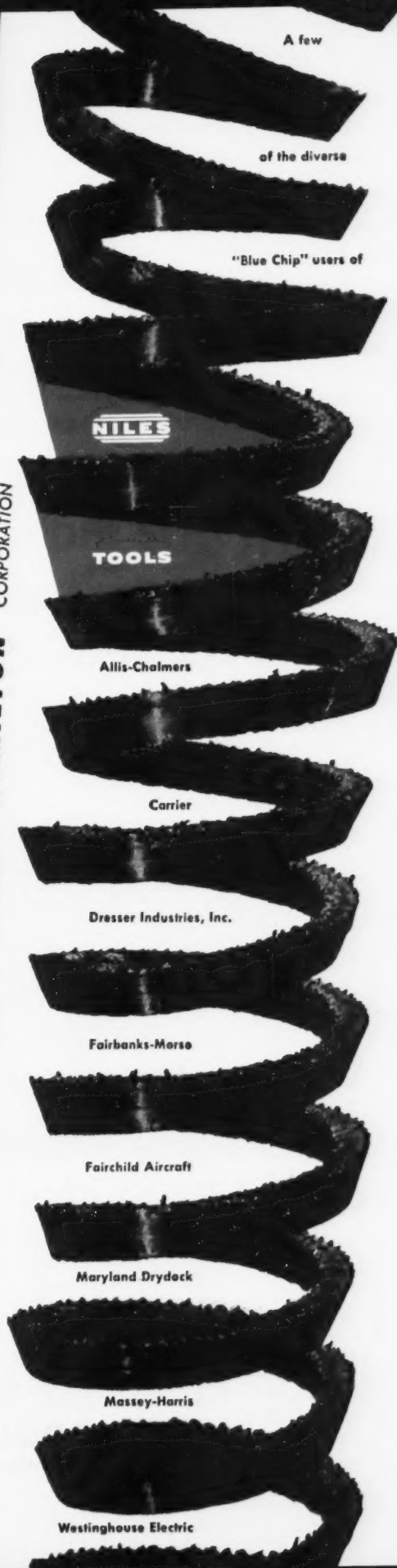
American Broach & Mch. Co., Ann Arbor, Mich.  
American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, Ill.  
Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Philadelphia 42, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.  
Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
Clifton Hydraulic Press Co., Clifton, N. J.  
Colonial Broach Co., P.O. Box 37, Harper Sta., Detroit, Mich.  
Dake Engine Co., 604 Seventh St., Grand Haven, Mich.  
Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.  
Erie Foundry Co., Erie, Pa.  
Farquhar, A. B., Div. Oliver Corp., 142 North Duke St., York, Pa.

(Continued on page 374)

For their big jobs, "Blue Chip" metalworking plants rely on Niles Heavy Duty Engine Lathes (up to 120" swing) and Niles Vertical Boring Mills (up to 43 feet) . . . the rugged high speed tools that handle the toughest jobs faster and at lower cost.



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Fairchild Aircraft

Maryland Drydock

Massey-Harris

Westinghouse Electric

Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
 Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.  
 Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.  
 Morgan Engrg. Co., Alliance, Ohio.  
 Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
 Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
 Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.  
 Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, Ill.  
 Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.  
 Wilson, K. R., 213 Mill St., Arcade, N. Y.

#### PRESSES, Pneumatic

Mead Specialties Co., 4114 North Knox Ave., Chicago 41, Ill.

#### PRESSES, Screw

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.  
 Dake Engine Co., 604 Seventh St., Grand Haven, Mich.  
 Ferracute Machine Co., Bridgeton, N. J.  
 Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
 Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J.

#### PRESSES, Sheet Metal Working

Allen, Alva F., Box 426, Clinton, Mo. (Bench)  
 American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
 Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Philadelphia 42, Pa.  
 Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.  
 Chambersburg Engrg. Co., Chambersburg, Pa.

Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.  
 Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill.  
 Cleveland Crane & Engrg. Co., Wickliffe, Ohio.  
 Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.  
 Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Dake Engine Co., 604 Seventh St., Grand Haven, Mich.  
 Danly Machine Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, Ill.  
 Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, Ill.  
 Espen-Lucas Machine Works, Front St., and Girard Ave., Philadelphia, Pa.  
 Famco Machine Co., 3134 Sheridan Rd., Kenosha, Wis.  
 Farquhar, A. B., Div., Oliver Corp., 142 North Duke St., York, Pa.  
 Ferracute Machine Co., Bridgeton, N. J.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.  
 L & J Press Corp., Elkhart, Ind.  
 Minster Machine Co., Minster, Ohio.  
 Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
 Sales Service Mch. Tool Co., 2363 University Ave., St. Paul, Minn.  
 Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, Ill.  
 Wales-Strippit Corp., N. Tonawanda, N. Y.  
 Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.  
 Wilson, K. R., 213 Mill St., Arcade, N. Y.  
 Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J.

#### PRESSES, Straightening

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
 Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, Ill.  
 Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Philadelphia 42, Pa.  
 Chambersburg Engrg. Co., Chambersburg, Pa.  
 Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.  
 Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Dake Engine Co., 604 Seventh St., Grand Haven, Mich.  
 Farquhar, A. B., Div., Oliver Corp., 142 North Duke St., York, Pa.

Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Morgan Engrg. Co., Alliance, Ohio.  
 Niagara Machine & Tool Works, (Hydraulic) 683 Northland Ave., Buffalo, N. Y.  
 Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
 Springfield Mch. Tool Co., Springfield, Ohio.  
 Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.  
 Wilson, K. R., 213 Mill St., Arcade, N. Y.

#### PROFILE—TRACING ATTACHMENTS

Lehigh Foundries, Inc., 1500 Lehigh Dr., Easton, Pa., (Lathe).

#### PROFILING MACHINES

Consolidated Mch. Tool Corp., Rochester, N. Y.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.  
 Gorton, George, Machine Co., 1110 W. 13th St., Racine, Wis.  
 Morey Machinery Co., Inc., 383 Lafayette St., New York, N. Y.  
 Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.

#### PULLEYS

Boston Gear Works, 3200 Main St., North Quincy 71, Mass.

#### PULLEYS, Friction Clutch

Brown & Sharpe Mfg. Co., Providence, R. I.

#### PUMPS, Coolant, Lubricant and Oil

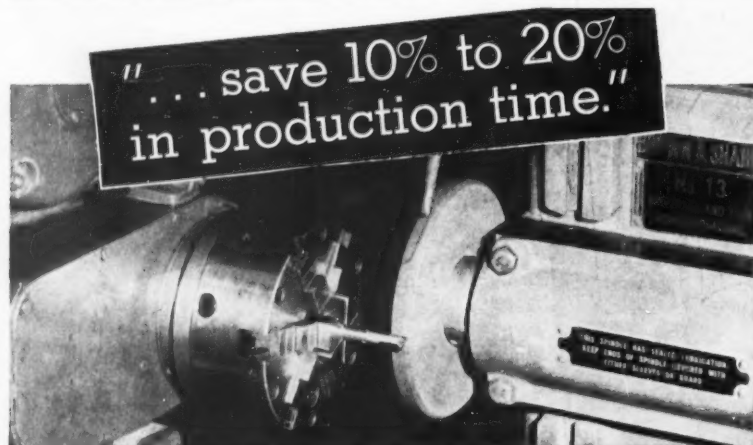
Brown & Sharpe Mfg. Co., Providence, R. I.  
 Delta Power Tool Div., Rockwell Mfg. Co., 620 E. Vienna Ave., Milwaukee, Wis.  
 Ingersoll-Rand Co., Phillipsburg, N. J.  
 Logansport Machine Co., Inc., 810 Center Ave., Logansport, Ind.  
 Ruthman Machinery Co., 1809 Reading Rd., Cincinnati 12, Ohio.  
 Sier-Bath Gear & Pump Co., Inc., 9248 Hudson Blvd., North Bergen, N. J.  
 South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
 Tompkins-Johnson Co., Jackson, Mich.  
 Vickers, Inc., 1402 Oakman Blvd., Detroit, Mich.  
 Viking Pump Co., Cedar Falls, Iowa.

#### PUMPS, Hydraulic

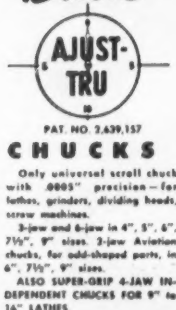
American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
 Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
 Barnes, John S., Corp., Rockford, Ill.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Chambersburg Engrg. Co., Chambersburg, Pa.  
 Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.  
 Gerotof May Corp., Oliver St. and Maryland Ave., Baltimore, Md.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Ingersoll-Rand Co., Phillipsburg, N. J.  
 Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.  
 Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
 Sier-Bath Gear & Pump Co., Inc., 9248 Hudson Blvd., North Bergen, N. J.  
 Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.  
 Vickers, Inc., 1402 Oakman Blvd., Detroit, Mich.  
 Viking Pump Co., Cedar Falls, Iowa.  
 Vinco Corp., 9113 Schaefer Highway, Detroit 28, Mich.  
 Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

#### PUMPS, Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
 Ingersoll-Rand Co., Phillipsburg, N. J.  
 (Continued on page 376)



## Buck Chucks ideal for grinders



Grinding the diameter and face of a centerless carbide tipped end mill — within plus .0000", minus .0005" — on a 5" Buck chuck is shown at the Brubaker Tool Corp., Millersburg, Pa.

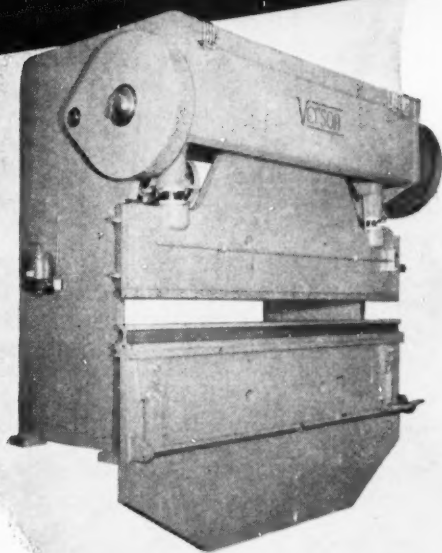
**THEIR REPORT:** "The chucking of various diameters to close tolerance is expedited with the Buck Adjust-Tru chuck. By limiting the indicator truing and chucking necessary with the old line chucks, we save 10% to 20% in production time."

You save every time you use a Buck — for dead true work, on duplicate parts chucking at scroll chuck speed (.0005" precision guaranteed), by eliminating costs of collets and special holding fixtures. No price premium. Send for latest catalog today.

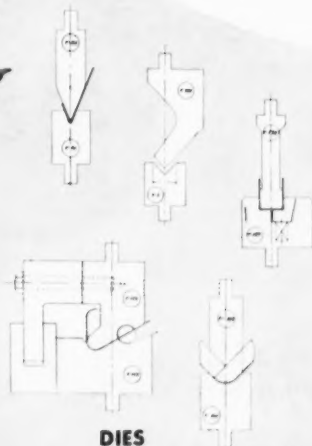
**BUCK TOOL COMPANY**  
 620 SCHIPPERS LANE • KALAMAZOO, MICH.



*If you  
form, bend,  
or punch metal...*



**PRESS BRAKES**



**DIES**



**TECHNICAL  
AIDS**

*Take Advantage  
of the complete*



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Whatever your requirements in press brakes and press brake dies, it will pay you to have full information on Verson's complete service available at all times. Check this list and write for the data you can use:

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**TECHNICAL AIDS**—Verson technical aids include the 112 page Die Manual which in addition to illustrating typical dies gives much selection and application data available nowhere else. Augmenting the manual is a handy pocket size tonnage calculator which quickly tells the tonnage required for making any bend. Copies of both of these aids can be had by request on your company letterhead.

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MACHINERY, June, 1954—375

**PUMPS, Rotary**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Sier-Bath Gear & Pump Co., Inc., 9248 Hudson  
Blvd., North Bergen, N. J.  
Sundstrand Machine Tool Co., 2531 11th St.,  
Rockford, Ill.  
Tuthill Pump Co., 939 E. 95th St., Chicago, 19,  
Ill.  
Vickers, Inc., 1402 Oakman Blvd., Detroit,  
Mich.  
Viking Pump Co., Cedar Falls, Iowa.

**PUNCHES AND DIES**

See Dies, Sheet Metal, Etc.

**PUNCHES, Centering**

Cleveland Punch & Shear Works Co., 3917 St.  
Clair Ave., N. E., Cleveland, Ohio.

**PUNCHING MACHINERY**

Allen, Alva F., Box 426 Clinton, Mo.  
Buffalo Forge Co., 490 Broadway, Buffalo,  
N. Y.  
Cincinnati Shaper Co., Elam and Garrard Aves.,  
Cincinnati, Ohio.  
Cleveland Punch & Shear Works Co., 3917 St.  
Clair Ave., N. E., Cleveland, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Famco Machine Tool Co., 3134 Sheridan Rd.,  
Kenosha, Wis.  
Ferrocut Machine Co., Bridgeton, N. J.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chi-  
cago, Ill.  
Niagara Mch. & Tool Works, 683 Northland  
Ave., Buffalo, N. Y.  
Ryerson Joseph T., & Son, Inc., 2558 W. 16th  
St., Chicago 18, Ill.  
Wales-Strippit Corp., N. Tonawanda, N. Y.  
Watson-Stillman Co., Div. H. K. Porter Co.,  
Inc., Roselle, N. J.  
Wiedemann Machine Co., 4272 Wissahickon  
Ave., Philadelphia, Pa.

**RACKS, Gear Cut**

Amgears, Inc., 6633 W. 65th St., Chicago 38,  
Ill.  
Boston Gear Works, 3200 Main St., North  
Quincy 71, Mass.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Gear Specialties, Inc., 2635 W. Medill Ave.,  
Chicago 47, Ill.  
Hartford Special Mchry. Co., 287 Homestead  
St., Hartford, Conn.  
Massachusetts Gear & Tool Co., 36 Nassau St.,  
Woburn, Mass.  
Ohio Gear Co., 1333 E. 179th St., Cleveland,  
Ohio.  
Philadelphia Gear Works, Inc., Erie Ave. and  
G St., Philadelphia, Pa.  
Stahl Gear & Mch. Co., 3901 Hamilton Ave.,  
Cleveland 14, Ohio.

**REAMER HOLDERS**

Gairing Tool Co., 21225 Hoover Rd., Detroit  
32, Mich.  
Lipe-Rollway Corp., 806 Emerson Ave., Syra-  
cuse, N. Y.  
McCosky Tool Corp., 1938 Thomas St., Mead-  
ville, Pa.  
Scully-Jones & Co., 1903 Rockwell St., Chicago  
8, Ill.  
Warner & Swasey Co., 8701 Carnegie Ave.,  
Cleveland 3, Ohio.

**REAMERS**

Atrax Co., Newton, Conn.  
Barber-Colman Co., Rock and Montague, Rock-  
ford, Ill.  
Butterfield Div., Union Twist Drill Co., Derby  
Line, Vt.  
Carboloy Dept., General Electric Co., Box 237,  
Roosevelt Park Annex, Detroit 27, Mich.  
Chicago-Latrobe Twist Drill Works, 411 W.  
Ontario St., Chicago, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St.,  
Cleveland, Ohio.  
DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit  
32, Mich.  
Firth Sterling Inc., 3113 Forbes St., Pitts-  
burgh 30, Pa.  
Gairing Tool Co., 21225 Hoover Rd., Detroit  
32, Mich.  
Gorham Tool Co., 14400 Woodrow Wilson,  
Detroit, Mich.

Greenfield Tap & Die Corp., Greenfield, Mass.  
Haynes Stellite Co., Div. Union Carbide &  
Carbon Corp., 30 E. 42nd St., New York,  
N. Y.  
Keo Cutters, 19326 Woodward, Detroit, Mich.  
Lipe-Rollway Corp., 806 Emerson Ave., Syra-  
cuse, N. Y.  
McCosky Tool Corp., 1938 Thomas St., Mead-  
ville, Pa.  
National Twist Drill & Tool Co., & Winter  
Bros. Co., Rochester, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Scully-Jones & Co., 1903 Rockwell St., Chi-  
cago 8, Ill.  
Super Tool Co., 21650 Hoover Rd., Detroit 13,  
Mich.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.  
Willey's Carbide Tool Co., 1340 W. Vernor  
Hwy., Detroit 1, Mich.

**REAMERS, Adjustable**

Barber-Colman Co., Rock and Montague, Rock-  
ford, Ill.  
Carboloy Dept., General Electric Co., Box 237,  
Roosevelt Park Annex, Detroit 32, Mich.  
Cleveland Twist Drill Co., 1242 E. 49th St.,  
Cleveland, Ohio.  
Firth Sterling Inc., 3113 Forbes St., Pitts-  
burgh 30, Pa.  
Gairing Tool Co., 21225 Hoover Rd., Detroit  
32, Mich.  
Gorham Tool Co., 14400 Woodrow Wilson,  
Detroit, Mich.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
McCosky Tool Corp., 1938 Thomas St., Mead-  
ville, Pa.  
Pratt & Whitney, West Hartford 1, Conn.  
Taft-Peirce Mfg. Co., Woonsocket, R. I.  
Union Twist Drill Co., Athol, Mass.  
Wesson Co., 1220 Woodward Heights Blvd.,  
Ferndale, Mich.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

**REAMERS, Taper Pin**

Butterfield Div., Union Twist Drill Co., Derby  
Line, Vt.  
Gorham Tool Co., 14400 Woodrow Wilson,  
Detroit, Mich.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Kaufman Manufacturing Co., Manitowoc, Wis.  
Lipe-Rollway Corp., 806 Emerson Ave., Syra-  
cuse, N. Y.  
National Twist Drill & Tool Co., & Winter Bros.  
Co., Rochester, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Union Twist Drill Co., Athol, Mass.  
Whitman & Barnes, 40600 Plymouth Rd.,  
Plymouth, Mich.

**REAMING MACHINES**

Barnes Drill Co., 814 Chestnut St., Rockford,  
Ill.  
Greaves Machine Tool Co., 2009 Eastern Ave.,  
Cincinnati, Ohio.  
Kaufman Manufacturing Co., Manitowoc, Wis.  
Pratt & Whitney, West Hartford 1, Conn.  
Van Norman Co., 3640 Main St., Springfield 7,  
Mass.

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for Counting**

National Acme Co., 170 E. 131st St., Cleve-  
land, Ohio.

**REELS, Stock, Standard and Automatic**

U. S. Tool Co., Inc., 255 North 18th St.,  
Ampere, N. J.

**REFRACTORS, Heat-Treating Furnace**

Norton Co., 1 New Bond St., Worcester 6,  
Mass.

**REGULATORS, Temperature**

General Electric Co., Schenectady, N. Y.


**REMOVERS, Japan, Enamel, Etc.**

Oakite Products, Inc., 19 Rector St., New York,  
N. Y.

(Continued on page 378)



To everyone this is  
a sign of good luck

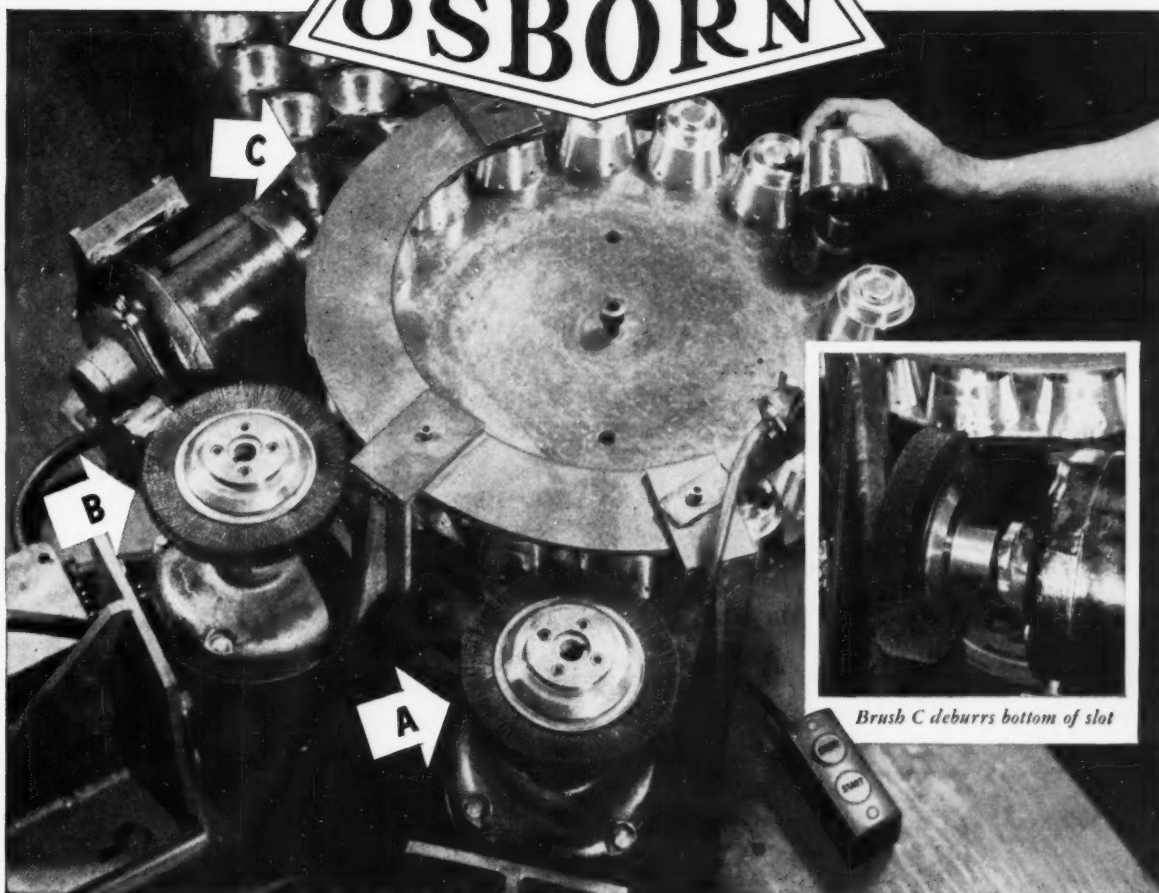
And to smart gear users  
this  is a sign  
of good gears.



"Gears... Good Gears Only"

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# OSBORN



Brush C deburrs bottom of slot

## Push-button brushing deburrs 1400 parts per hour

*The Problem* here was to remove feather burrs from a machined slot in aluminum ammunition components . . . fast. By a hand method, output was only 360 per hour and results were not uniform.

With the help of the Osborn Brushing Analyst, the company built the rotating fixture shown above, equipped with three Osborn Master® Wheel brushes. Parts are placed on pins on clockwise-rotating table. Brush A, rotating clockwise, deburrs the corner of one side of slot. Brush B, rotating counterclockwise, deburrs the other side corner. Brush C deburrs the bottom corner. Slots come clean and smooth . . . at a rate of 1400 per hour!

Find out how power brushing can improve your product deburring, cleaning and finishing! Call the OBA or write The Osborn Manufacturing Company, Dept. D-18, 5401 Hamilton Avenue, Cleveland 14, Ohio.



Brushes A and B deburr side corners.  
Brushes rotate at 3450 rpm.

# Osborn Brushes®

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

For more information on products advertised, use Inquiry Card, page 245

MACHINERY, June, 1954—377

**RETAINING RINGS FOR BEARINGS, Etc.**

Nice Ball Bearing Co., Nicetown, Philadelphia, Pa.  
Wades-Kahinor, Inc., 4716 Austel Place, Long Island City 1, N. Y.

**RHEOSTATS**

Allen-Bradley Co., 1326 S. 2nd St., Milwaukee, Wis.  
General Electric Co., Schenectady, N. Y.

**RIVET SETS**

Bethlehem Steel Co., Bethlehem, Pa.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.

**RIVETERS, Hydraulic**

Bethlehem Steel Co., Bethlehem, Pa.  
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Hanna Engineering Works, 1752 Elston Ave., Chicago, Ill.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
Morgan Engrg. Co., Alliance, Ohio.

**RIVETERS, Pneumatic**

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Grant Mfg. & Machine Co., 90 Silliman St., Bridgeport 5, Conn.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Keller Tool Co., Grand Haven, Mich.  
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.

**RIVETING MACHINES**

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Grant Mfg. & Machine Co., 90 Silliman St., Bridgeport 5, Conn.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.  
Tomkins-Johnson Co., Jackson, Mich.

**RIVET MAKING MACHINES**

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.

**RUBBER PRODUCTS**

Garlock Packing Co., Palmyra, N. Y.

**RULES, Steel**

Brown & Sharpe Mfg. Co., Providence, R. I.  
Lufkin Rule Co., Hess Ave., Saginaw, Mich.  
Millers Falls Co., Greenfield, Mass.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
Starrett, The L. S. Co., Athol, Mass.

**RUST PREVENTIVES**

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.  
Oakite Products, Inc., 19 Rector St., New York, N. Y.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

**SAND BLAST EQUIPMENT**

See Blast Cleaning Equipment

**SANDERS**

Black & Decker Mfg. Co., E. Penna Ave., Towson, Md.  
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Jarvis, Charles L., Co., Middletown, Conn.  
Keller Tool Co., Grand Haven, Mich.  
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.  
Millers Falls Co., Greenfield, Mass.  
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

**SAW BLADES, Hack**

Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago, Ill.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Millers Falls Co., Greenfield, Mass.  
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
Starrett, The L. S. Co., Athol, Mass.  
Victor Saw Works, Inc., Middletown, N. Y.

**SAW SHARPENING MACHINES**

Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa.  
Mott & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.  
Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

**SAWING MACHINES, Circular**

Consolidated Mch. Tool Corp., Rochester, N. Y.  
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa.  
Mott & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.

**SAWING MACHINES, Friction**

DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Ryerson Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.

**SAWING MACHINES, Metal Cutting Band**

Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago, Ill.  
Boice-Crane, 941 W. Central Ave., Toledo, Ohio.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Fanco Machine Co., 3134 Sheridan Rd., Kenosha, Wis.  
Grob, Inc., Grafton, Wis.  
Ryerson Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
Walker-Turner Div., Kearney & Trecker Corp., South Ave., Plainfield, N. J.

**SAWING MACHINES, Power Hack**

Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago, Ill.  
Austin Industrial Corp., 76 Mamaroneck Ave., White Plains, N. Y.  
Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
Ryerson Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
Victor Saw Works, Inc., Middletown, N. Y.

**SAWS, Circular Metal Cutting**

Alina Corp., 401 Broadway, New York 13, N. Y. (Portable)  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Johnson Mfg. Co., Albion, Mich.  
Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa.  
Gorham Tool Co., 14400 Woodward Wilson, Detroit, Mich.

(Continued on page 380)

When the need  
is for **SPEED**  
and  
**PRECISION**

*you need a*

**GRAND RAPIDS GRINDER**

Here is extra value, extra accuracy, extra high-speed performance. Every Grand Rapids Hydraulic Feed Surface Grinder has a one-piece column and base for vibrationless rigidity and permanent alignment between cross travel ways and upright headways. Both longitudinal table travel and cross feed are hydraulically operated. On the larger machines, the wheel head is powered for rapid vertical travel. *The model 55 has longitudinal table speed of 125 fpm!*

Parts machined to micrometric tolerances, precision assembled for freedom of action, no play. That's why 6 out of 10 are sold to firms already using Grand Rapids Grinders.

Send for full facts today . . . we'll answer within 24 hours

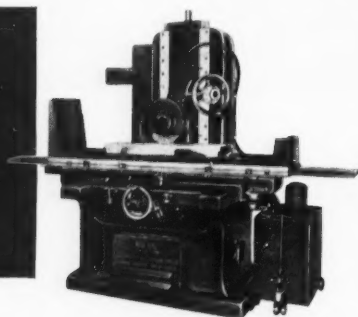


Please send me the following literature without obligation:

- ☐ Surface Grinder Catalog  
☐ Universal Cutter and Tool Grinder Catalog

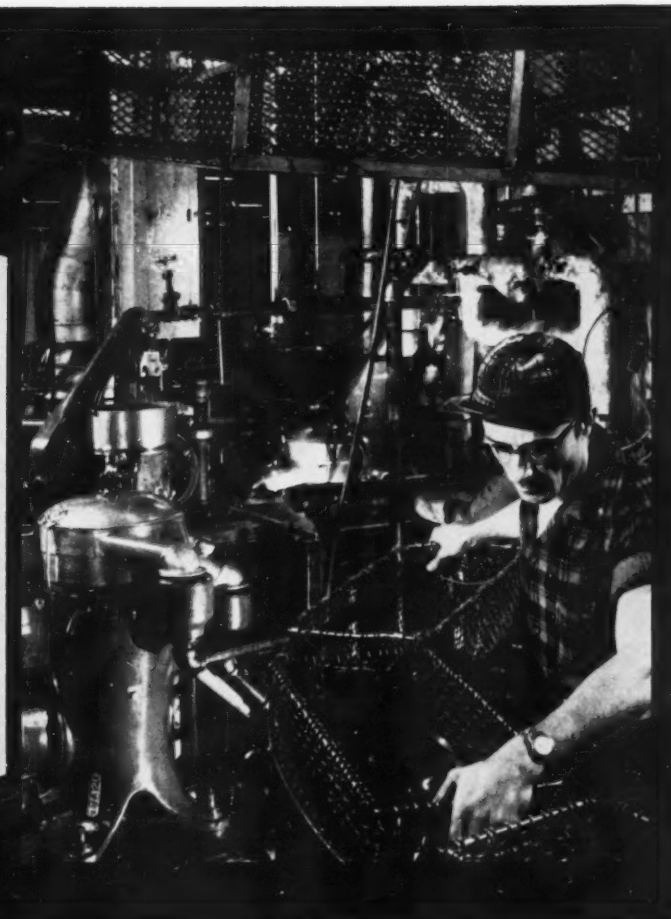
Attach to Letterhead and Mail to:  
**GALLMEYER & LIVINGSTON CO.**

425 Straight Ave., Grand Rapids, Mich.





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There are some 18 different applications in machine-shop practice in which De Laval Purifiers and Clarifiers have demonstrated their ability to save money or to improve the product or both. They can do as much for you.

De Laval Purifiers can be depended upon to make the *re-use* of cutting oils and coolants *profitable*.

Oils clarified with De Laval Clarifiers lengthen tool life... frequently allow higher cutting or grinding speeds

... minimize wheel dressing... permit work to closer tolerances... result in better finishes in less time.

And De Laval Chip Oil Extractors have proved a sound investment in dozens of plants.

De Laval Separation Specialists are experienced in every phase of the machine-shop use of centrifugals. They have shown other manufacturers how to save money. Let them do the same for you.



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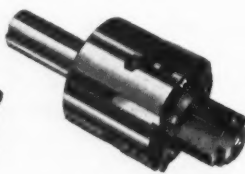
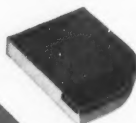
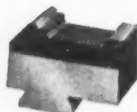
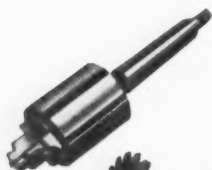
# DE LAVAL

## SEPARATION SPECIALISTS

*for Special Service  
on Carbide "Specials"*

# GORHAM

## GORHAM GORHAM



**Gorham TOOL COMPANY**

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

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WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif.



When your production machining problem dictates the use of special carbide tooling, your nearby Gorham Field Engineer can give you the right answers fast! He's an expert in the design and application of special cutting tools . . . and he provides a complete engineering service to determine your exact requirements.

He begins with your product, sketch or idea. He surveys your production operations and available equipment. He considers work material properties and required finishes and tolerances. He plots speeds, feeds and methods of tool driving. Then he develops practical design and metallurgical specifications for a special tool that's "tailor-made" for your application. And his recommendations are backed by Gorham's more than thirty years' experience in the design, manufacture and heat treatment of fine cutting tools.

Yes, your nearby Gorham Field Engineer is a helpful man to have around! If you haven't yet met him, write for his name, or send details of your problem direct, and we'll have him get in touch with you promptly.

Match & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.  
National Twist Drill & Tool Co., & Winter Bros., & Co., Rochester, Mich.  
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
Union Twist Drill Co., Athol, Mass.  
Walker-Turner Div., Kearney & Trecker Corp., 900 North Ave., Plainfield, N. J.

### SAWS, Metal Cutting Band

Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago, Ill.  
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.  
Johnson Mfg. Co., Albion, Mich.  
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
Starrett, The L. S. Co., Athol, Mass.  
Walker-Turner Div., Kearney & Trecker Corp., 900 North Ave., Plainfield, N. J.

### SAWS, Portable Electric

Back & Decker Mfg. Co., E. Penna. Ave., Towson, Md.  
Millers Falls Co., Greenfield, Ohio.

### SAWS, Screw Slotting

Barber-Colman Co., Rock and Montague, Rockford, Ill.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
National Twist Drill & Tool Co., & Winter Bros. Co., Rochester, Mich.  
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
Starrett, The L. S. Co., Athol, Mass.  
Union Twist Drill Co., Athol, Mass.

### SCRAPERS, Hand and Power

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, Ill.

### SCREW DRIVERS, Power

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Keller Tool Co., Grand Haven, Mich.

### SCREW DRIVING AND NUT SETTING EQUIPMENT

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md.  
Errington Mechanical Laboratory, Inc., 24 Norwood Ave., Stapleton, S. I., N. Y.  
Ingersoll-Rand Co., Phillipsburg, N. J.  
Jarvis, Charles L. Co., Middletown, Conn.  
Keller Tool Co., Grand Haven, Mich.

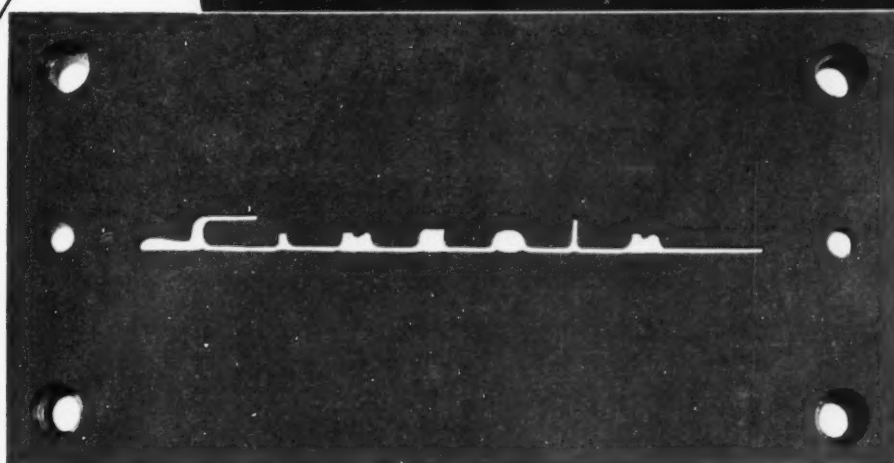
### SCREW MACHINE TOOLS AND EQUIPMENT

Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill.  
Millers Falls Co., Greenfield, Mass.  
National Acme Co., 170 E. 131st St., Cleveland.  
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
Potter & Johnston Co., 1027 Newport Ave., Pawtucket, R. I.  
R and L Tools, 1825 Bristol St., Philadelphia 40, Pa.  
Reed Rolled Thread Die Co., P. O. Box 350, Worcester 1, Mass.  
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

(Continued on page 382)



**can you make  
this trim die  
in eleven hours  
in your plant?**



FINISH TRIM DIE



ELECTRODE

**we will show you how**

**elox** *corporation of michigan*

735 N. Rochester Road • Clawson, Michigan

For more information on products advertised, use Inquiry Card, page 245

**man hours:**

ELECTRODE MACHINING..... 8 hours  
SETUP..... 2 hours  
CUTTING TIME..... 1 hour

MACHINERY, June, 1954—381

**SCREW MACHINE WORK**

Eastern Mch. Screw Corp., New Haven, Conn.  
 Mueller Brass Co., Port Huron 35, Mich.  
 National Acme Co., 170 E. 131st St., Cleveland.  
 Ottemiller, W. H., Co., York, Pa.  
 Standard Pressed Steel Co., Jenkintown, Pa.  
 Wicaco Machine Corp., Stenton Ave., and  
 Loudon St., Philadelphia, Pa.

**SCREW MACHINES, Automatic Single and Multiple Spindle**

Brown & Sharpe Mfg. Co., Providence, R. I.  
 Cone Automatic Mch. Co., Inc., Windsor, Vt.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis.  
 Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
 New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
 Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

**SCREW MACHINES, Hand**

See also Lathes, Turret  
 Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
 Hardinge Bros., Inc., 1418 College Ave., Elmira, N. Y.  
 Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
 Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.  
 Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

**SCREW PLATES**

Butterfield Div., Union Twist Drill Co., Derby Line, Vt.  
 Card, S. W., Mfg. Co., Div. Union Twist Drill Co., Mansfield, Mass.  
 Greenfield Tap & Die Corp., Greenfield, Mass.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Winter Bros. Co., Rochester, Mich.

**SCREWS, Cap, Set, Safety Set and Machine, Etc.**

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn.  
 Allied Products Corp., 12677 Burt Rd., Detroit 23, Mich.  
 Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y. (Stainless Steel only.)  
 Chicago Screw Co., Bellwood, Ill.  
 National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
 Ottemiller, W. H., Co., York, Pa.  
 Parker-Kalon Div., General American Transportation Corp., 200 Varick St., New York, N. Y.  
 Republic Steel Corp., Bolt & Nut Div., Republic Bldg., Cleveland 1, Ohio.  
 Russell, Burdall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y.  
 Standard Pressed Steel Co., Jenkintown, Pa.

**SCREWS, Self-tapping, Drive**

Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y. (Stainless Steel only.)  
 Parker-Kalon Div., General American Transportation Corp., 200 Varick St., New York, N. Y.

**SCREWS, Thumb**

Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y. (Stainless Steel only.)  
 Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.  
 Parker-Kalon Div., General American Transportation Corp., 200 Varick St., New York, N. Y.

Russell, Burdall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**SEALS AND RETAINERS, Oil or Grease**

Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill.  
 Garlock Packing Co., Palmyra, N. Y.  
 Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, Ill.

**SECOND-HAND MACHINERY, Etc.**

Eastern Machinery Co., 1006 Tennessee Ave., Cincinnati 22, Ohio.  
 Miles Machinery Co., Box 770 Saginaw, Mich.  
 Morey Machinery Co., Inc., 383 Lafayette St., New York, N. Y.  
 Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.

**SEPARATORS, Centrifugal**

De Laval Separator Co., Poughkeepsie, N. Y.  
 The Sharples Corp., 2300 Westmoreland St., Philadelphia 40, Pa.

**SEPARATORS, Oil or Coolant**

Barnes Drill Co. (Magnetic), 814 Chestnut, Rockford, Ill.  
 National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
 The Sharples Corp., 2300 Westmoreland St., Philadelphia 40, Pa.

**SHAFTING, Steel**

Bethlehem Steel Co., Bethlehem, Pa.  
 Cumberland Steel Co., Cumberland, Md.  
 De Laval Separator Co., Poughkeepsie, N. Y.  
 Republic Steel Corp., Union Drawn Steel Div., Republic Bldg., Cleveland 1, Ohio.  
 Ryerson, Jas. T. & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
 Summerill Tubing Co., Div. Columbia Steel & Shafting Co., P.O. Box 1557 Pittsburgh, 30, Pa.

**SHAFTS**

National Forge & Ordnance Co., Irvine, Warren County, Pa.  
 Standard Pressed Steel Co., Jenkintown, Pa.  
 Summerill Tubing Co., Div. Columbia Steel & Shafting Co., P. O. Box 1557, Pittsburgh 30, Pa.

**SHAFTS, Flexible**

Jarvis, Chas. L., Co., Middletown, Conn.

**SHAFTS, Hollow-Bored**

Bethlehem Steel Co., Bethlehem, Pa.

**SHAFTS, Turned and Ground**

Bethlehem Steel Co., Bethlehem, Pa.  
 Cumberland Steel Co., Cumberland, Md.  
 National Forge & Ordnance Co., Irvine, Warren County, Pa.  
 Republic Steel Corp., Union Drawn Steel Div., Republic Bldg., Cleveland 1, Ohio.  
 Ryerson, Jas. T. & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
 Summerill Tubing Co., Div. Columbia Steel & Shafting Co., P.O. Box 1557, Pittsburgh 30, Pa.

**SHAPER-PLANERS**

Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.

**SHAPERS**

American Tool Works Co., Pearl and Eggleston Ave., Cincinnati, Ohio.  
 Austin Industrial Corp., 76 Mamaroneck Ave., White Plains, N. Y.  
 Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.  
 Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.  
 Orban, Kurt, Co., Inc., 205 East 42nd St., New York 17, N. Y.  
 Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.  
 Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.  
 Smith & Mills Shapers, Inc., Div. Hamilton-Thomas Corp., Hamilton, O.  
 South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.

(Continued on page 386)

**EVERY TYPE PRECISION GEAR**

*... produced to your specifications*

"Mass Gear" offers machining and cutting facilities for producing all types of precision gears in small and medium sizes. Gear tooth finishing and inspection equipment are backed by a competent staff of gear-producing specialists.

You can depend on "Mass Gear" service to meet your individual requirements. Submit your specifications . . . ask for a "Mass Gear" estimate.

**Massachusetts Gear & Tool Co.**  
 WOBURN, MASS.



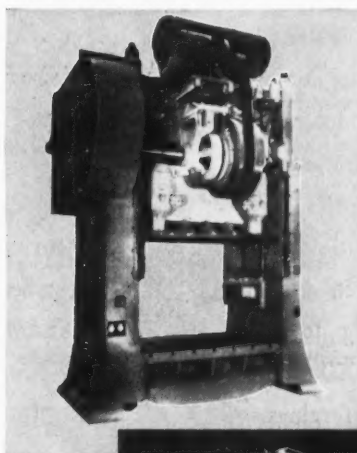
**you get more...**

**out of every press with a  
CLEVELAND DRUM TYPE CLUTCH!**

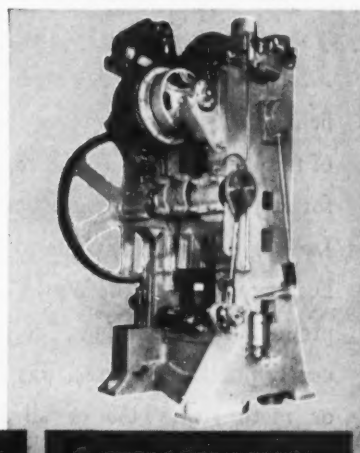
**TWO POINT PRESS TWIN DRIVE**



**TWO POINT PRESS SINGLE END DRIVE**



**KNUCKLE JOINT PRESS**



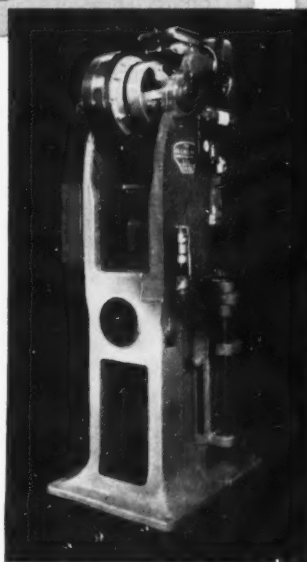
Extensive field use proves that the patented Cleveland Clutch and Brake improves all types of press performance. In every case operating records indicate less press downtime due to clutch failure; extended die life because of greater slide control.

Simplicity of design makes this air-operated clutch practically foolproof. Clutch and Brake cannot become separated or engaged simultaneously for they are a combined unit of one-piece construction. Positive, spring loaded brake brings slide to immediate stop on failure of electric current or air supply. Design and lightness of parts contribute to quicker starting and stopping.

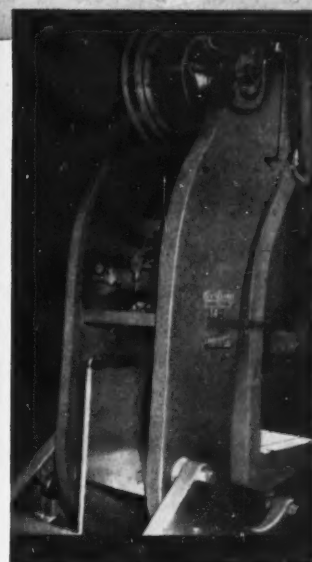
As you can see in the presses shown here, the compact Cleveland Clutch is mounted directly on the driveshaft. Best of all, it's easily installed on new or old presses.

To get more out of your presses, install new Cleveland Drum Type Clutch units. We will gladly send you full specifications, or furnish you with any additional information you may desire on "The Clutch that's revolutionizing press production".

A-9300



**HORNING PRESS**



**INCLINABLE PRESS**



**Established 1880**

**POWER PRESSES — FABRICATING TOOLS**

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Offices at: NEW YORK • CHICAGO • DETROIT  
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**CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT**



# The LANSING

## LANSING, MICHIGAN DROP FORGING CAPITAL OF THE WORLD

LANSING, capital city of Michigan, is famous for many things, particularly in the automotive field, but it is unique among the industrial cities of the United States in the concentration of drop forging activity in its many factories. Indeed, Lansing may well lay claim to the title of "Drop Forging Capital of the World", for its annual production of forgings, according to recently published figures, was 208,000 tons, or more than 11% of all the forgings produced annually in the United States, which was 1,885,662 tons.

Located in Lansing are six great forging plants, covering 14 acres of land, with a working area of over 985,579 square feet and representing an investment in excess of \$26,000,000. Annual payrolls of

these companies total in excess of \$15,520,000.

All these great forging companies are using Chambersburg Ceco-Drops. The first was installed in Shop No. 1 in 1947, the year the Ceco-Drop was introduced. In 1948, Shop No. 4 installed two Ceco-Drops and Shop No. 3 installed one. In 1950 Shop No. 2 installed two, and Shop No. 4 repeated with one. In 1951 Shop No. 2 repeated with two and Shop No. 4 again repeated with two. Also in 1951 Shop No. 3 repeated with two and Shop No. 6 installed eight. In 1952 this shop repeated with three and Shop No. 3 repeated with one. That same year Shop No. 5 installed three. In 1953 Shop No. 2 repeated with one and Shop No. 4 with two more.



*Write for details*

**CHAMBERSBURG ENGINEERING COMPANY**

# CECO

# STORY..

## FORGE SHOP No. 1



**THE FIRST CECO-DROP IN LANSING WAS INSTALLED HERE.** THIS COMPANY SPECIALIZES IN AUTOMOTIVE FORGINGS. CECO-DROP IS FORGING AUTOMOBILE CONNECTING RODS—A TOUGH JOB.

## FORGE SHOP No. 2



**5 CECO-DROPS SINCE 1950.** THIS COMPANY ALSO WORKS LARGELY ON AUTOMOTIVE FORGINGS. CLAIM GREATER PRODUCTION THAN ON BOARD DROPS. THEIR HAMMERMEN PREFER CECO-DROPS.

## FORGE SHOP No. 3



**4 CECO-DROPS SINCE 1948.** THEY WORK LARGELY ON AUTOMOTIVE AND COMMERCIAL FORGINGS. CECO-DROPS HAVE DONE A GOOD JOB, ACCORDING TO MANAGEMENT.

## FORGE SHOP No. 4



**7 CECO-DROPS SINCE 1948.** FORGE AUTOMOTIVE STEERING GEARS, UNIVERSAL JOINTS, ETC. HIGHLY SATISFIED WITH PERFORMANCE OF THEIR SEVEN CECO-DROPS.

## FORGE SHOP No. 5



**3 CECO-DROPS SINCE 1952.** THIS COMPANY IS WORKING ON SMALLER TYPE OF FORGINGS, LARGELY AUTOMOTIVE. CECO-DROPS ARE A PART OF THEIR EXPANSION PROGRAM.

## FORGE SHOP No. 6



**11 CECO-DROPS SINCE 1951.** ONE OF THE LARGEST FORGE SHOPS IN THE WORLD. THE CECO-DROPS ARE WORKING ON AERONAUTICAL AND AUTOMOTIVE FORGINGS.

**CHAMBERSBURG**

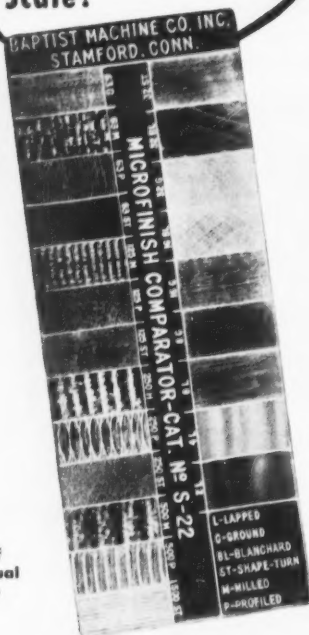
**PENNSYLVANIA**

# DROP



**NOW!**

**A  
Convenient, Reliable  
Surface Roughness  
Scale!**



Half  
Actual  
Size

## The S-22 MICROFINISH COMPARATOR

—A convenient, economical tool that provides a positive, uniform system of comparison. Electroformed of corrosion-resistant nickel, it reproduces accurately 22 machined surfaces, with numbers opposite each surface to represent the roughness in micro-inches.

**FOR PURCHASING**—Use it to coordinate buying.

— **ENGINEERING**—To translate thinking to the blueprint.

— **INSPECTION**—To insure product accuracy.

— **IN THE SHOP**—To speed production, increase operator earnings.

— **QUALITY CONTROL**—To insure uniformity and reduce inspection costs.

Convenient to handle; packed in sturdy leather case.

**\$15.00**

**BAPTIST MACHINE CO**  
36 LUDLOW STREET  
STAMFORD, CONN.

### SHAPERS, Vertical

Austin Industrial Corp., 76 Mamaroneck Ave., White Plains, N. Y.  
Pratt & Whitney, West Hartford 1, Conn.  
Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.

### SHAPES, Cold Drawn Steel

Columbia Steel & Shifting Co., P.O. Box 1557, Pittsburgh 30, Pa.  
Summerill Tubing Co., Div. Columbia Steel & Shifting Co., P.O. Box 1557, Pittsburgh 30, Pa.

### SHAPES, Structural

Bethlehem Steel Co., Bethlehem, Pa.  
U. S. Steel Corp. (Carnegie-Illinois Steel Corp. Div. Columbia Steel Co., Div. Tennessee Coal, Iron & R. R. Co., Div.), 436 7th Ave., Pittsburgh, Pa.

### SHEARING MACHINERY

Bethlehem Steel Co., Bethlehem, Pa.  
Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.  
Cleveland Crane & Engr. Co., Wickliffe, Ohio.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Ferracute Machine Co., Bridgeton, N. J.  
Hannifin Corp., 1101 S. Kilburn Ave., Chicago, Ill.  
Morgan Engrg. Co., Alliance, Ohio.  
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
Ryerson, Jos. T. & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.  
Yader Co., 550 Walworth Ave., Cleveland, Ohio.

### SHEARS, Alligator

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.

### SHEARS, Rotary

Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio.  
Brown & Sharpe Mfg. Co., Providence, R. I.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
Ryerson, Jos. T. & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
Simonds Saw & Steel Co. (Knives), 470 Main St., Fitchburg, Mass.  
Union Twist Drill Co., Athol, Mass.

### SHEARS, Squaring

Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.  
Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.  
Columbia Div., Lodge & Shipley Co., Hamilton 1, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Famco Machine Co., 3134 Sheriden Rd., Kenosha, Wis.  
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
Simonds Saw & Steel Co. (Blades), 470 Main St., Fitchburg, Mass.

### SHEET METALS

American Brass Co., 25 Broadway, New York, N. Y.  
Bethlehem Steel Co., Bethlehem, Pa.  
New Jersey Zinc Co., 160 Front St., New York, N. Y.  
Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
Ryerson, Jos. T. & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
U. S. Steel Corp. (Carnegie-Illinois Steel Corp. Div. Columbia Steel Co., Div. Tennessee Coal, Iron & R. R. Co., Div.), 436 7th Ave., Pittsburgh, Pa.

### SHEETS, Iron and Steel

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
Bethlehem Steel Co., Bethlehem, Pa.  
Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.

Ryerson, Jos. T. & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
U. S. Steel Corp. (Carnegie-Illinois Steel Corp. Div. Columbia Steel Co., Div. Tennessee Coal, Iron & R. R. Co., Div.), 436 7th Ave., Pittsburgh, Pa.

### SHIMS

Laminated Shim Co., Inc., Glenbrook, Conn.

### SLEEVES

Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.  
National Twist Drill & Tool Co., Rochester, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Union Twist Drill Co., Athol, Mass.

### SLOTING MACHINES

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Lobdell United Co., 2000 "G" St., Wilmington 99, Del.  
Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.

### SOCKETS

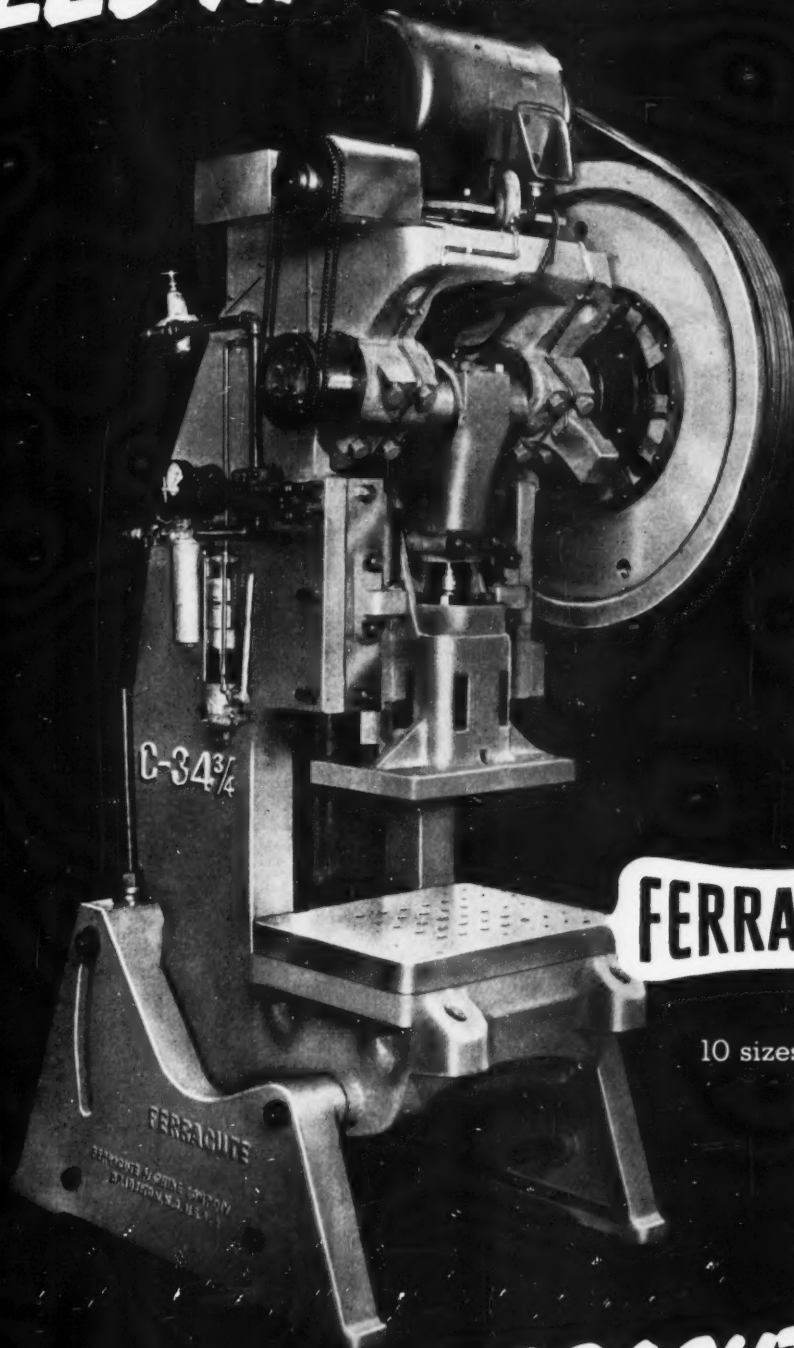
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
Chicago-Latrobe Twist Drill Wks., 411 W. Ontario St., Chicago, Ill.  
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.  
Greenfield Tap & Die Corp., Greenfield, Mass.  
National Twist Drill & Tool Co., Rochester, Mich.  
Pratt & Whitney, West Hartford 1, Conn.  
Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.  
Union Twist Drill Co., Athol, Mass.  
Williams, J. H. Co., 400 Vulcan St., Buffalo 7, N. Y.

### SPECIAL MACHINERY AND TOOLS

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
Baird Machine Co., 1700 Stratford Ave., Stratford, Conn.  
Baker Bros., Inc., Sta. F., P.O. Box 101, Toledo 10, Ohio.  
Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
Barnes, W. F. & John Co., 201 S. Water St., Rockford, Ill.  
Baush Machine Tool Co., 156 Wascon Ave., Springfield 7, Mass.  
Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
Bethlehem Steel Co., Bethlehem, Pa.  
Bigram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa.  
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.  
Blanchard Mch. Co., 64 State St., Cambridge, Mass.  
Bliss, E. W. Co., 1375 Raff Rd., S. W., Canton, Ohio.  
Chambersburg Engrg. Co., Chambersburg, Pa.  
Colonial Broach Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
Columbus Die-Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.  
Consolidated Mch. Tool Corp., Rochester, N. Y.  
Coulter, James, Machine Co., Bridgeport 5, Conn.  
Espin-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.  
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
Fischer Machine Co., 310 No. 11th St., Philadelphia, Pa.  
Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.  
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.  
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
Gorton, Geo. Mch. Co. Co., 1110 W. 13th St., Racine, Wis.  
Grant Mfg. & Mch. Co., 90 Silliman St., Bridgeport 5, Conn.  
Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill.  
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago.  
(Continued on page 388)



**NEED AN INCLINABLE?**



**FERRACUTE**

10 sizes - 6 to 200 tons

**MAKE IT A FERRACUTE!**

Since 1863 Manufacturers of Power Presses & Special Machinery, FERRACUTE MACHINE CO., Bridgeton, N. J., U.S.A.

Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.  
 John, B. Manufacturing Co., Ellis St., New Britain, Conn.  
 Kingsbury Mch. Tool Corp., Keene, N. H.  
 Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.  
 Lehmann Machine Co., 3560 Chateau Ave., St. Louis, Mo.  
 Lipe-Railway Corp., 806 Emerson Ave., Syracuse, N. Y.  
 Michigan Tool Co., 7171 E. McNicholas Rd., Detroit 12, Mich.  
 Modern Industrial Engrg. Co., 14230 Birwood, Detroit 4, Mich.  
 Moline Tool Co., 102 20th St., Moline, Ill.  
 Morgan Engrg. Co., Alliance, Ohio.  
 Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
 Match Match & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.  
 National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
 National Automatic Tool Co., Inc. S 7th and N Sts., Richmond, Ind.  
 National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.  
 National Tool Co., 11200 Madison Ave., Cleveland, Ohio.  
 National Twist Drill & Tool Co., Rochester, Mich.  
 New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.  
 New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.  
 Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.  
 Oilgear Co., 1560 W. Pierce St., Milwaukee 4.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
 Seneca Falls Mch. Co., Seneca Falls, N. Y.  
 Snyder Tool & Engrg. Co., 3400 E. Lafayette, Detroit 7, Mich.

Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.  
 Turner Bros., Inc., 2625 Hilton Rd., Ferndale 20, Mich.  
 Union Twist Drill Co., Athol, Mass.  
 Universal Engrg. Co., Frankenmuth 2, Mich.  
 Waltham Machine Works, Newton St., Waltham, Mass.  
 Wicoco Machine Corp., Stenton Ave. and Loudon St., Philadelphia, Pa.  
 Zagar Tool Co., 24000 Lakeland Blvd., Cleveland 23, Ohio.

#### SPEED REDUCERS

Boston Gear Work, 3200 Main St., North Quincy 71, Mass.  
 Brad Foote Gear Works, 1309 S. Cicero Ave., Cicero 50, Ill.  
 Cleveland Worm & Gear Co., 3249 E. 80th St., Cleveland, Ohio.  
 Cone-Drive Gears, Div., Michigan Tool Co., 7171 E. McNicholas Rd., Detroit 12, Mich.  
 Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.  
 General Electric Co., Schenectady, N. Y.  
 Link-Belt Co., 2045 W. Huntington Park Ave., Philadelphia 40, Pa.  
 Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.  
 Perkins Machine & Gear Co., West Springfield, Mass.  
 Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.  
 Twin Disc Clutch Co., 1361 Racine St., Racine, Wis.

#### SPINDLES, Grinding

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Pope Mchry. Corp., Haverhill, Mass.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.

#### SPINNING LATHES

See Chucking Machines.

#### SPROCKET CHAINS

Boston Gear Works, 3200 Main St., North Quincy 71, Mass.  
 Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6, Ind.  
 Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.  
 Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.

#### SPROCKETS

Amgears, Inc., 6633 W. 65th St., Chicago 38, Ill.  
 Boston Gear Works, 3200 Main St., North Quincy 71, Mass.  
 Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
 Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6, Ind.  
 Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.  
 Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.  
 Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 14, Ohio.

#### STAMPINGS, All Metal

LaSalle Steel Co., Hammond, Ind.  
 Winzeler Mfg. & Tool Co., 1712 West Arcade Pl., Chicago 12, Ill.

#### STAMPINGS, Sheet Metal

Laminated Shim Co., Inc., Glenbrook, Conn.  
 Republic Steel Corp., Niles Steel Products Div., Republic Bldg., Cleveland 1, Ohio.  
 Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.  
 Winzeler Mfg. & Tool Co., 1712 West Arcade Pl., Chicago 12, Ill.

#### STEEL

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 American Steel & Wire Co., Div. U. S. Steel Corp., Rockefeller Bldg., Cleveland, Ohio.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Carpenter Steel Co., Reading, Pa.  
 Crucible Steel Co., of America, Chrysler Bldg., New York, N. Y.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 National Forge & Ordnance Co., Irvine, Warren County, Pa.  
 Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
 Ryerson, Jos. T. & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
 Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
 Summerill Tubing Co., Div., Columbia Steel & Shafting Co., P. O. Box 1557, Pittsburgh 30, Pa.  
 Timken Roller Bearing Co., Canton, Ohio.  
 U. S. Steel Corp., (American Steel & Wire Co. Div., Carnegie-Illinois Steel Corp., Div. Columbia Steel Co., Div. Tennessee Coal, Iron & R. R. Co. Div.), 436 Ave., Pittsburgh, Pa.  
 U. S. Steel Supply Div., U. S. Steel Co., 208 S. LaSalle St., Chicago 4, Ill.  
 Wheeler-Lovejoy & Co. Inc., Cambridge, Mass.

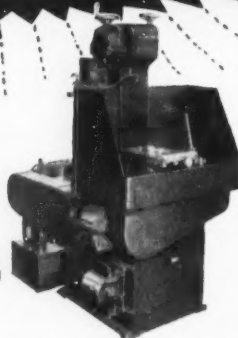
#### STEEL, Cold Drawn

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 American Steel & Wire Co., Div. U. S. Steel Corp., Rockefeller Bldg., Cleveland, Ohio.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Crucible Steel Co., of America, Chrysler Bldg., New York, N. Y.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 Republic Steel Corp., Union Drawn Steel Div., Massillon, Ohio.

(Continued on page 390)

**STARTS  
INSTANTANEOUSLY!**

**THE  
RUTHMAN  
GUSHER  
COOLANT  
PUMP**



Illustrated is a Hammond 8" Model V-SWP Wet and Dry Abrasive Belt Grinder equipped with a Gusher Coolant pump.



With a Ruthman Gusher Coolant Pump you get plenty of coolant when you want it, the instant the machine is turned on. There is no priming necessary, Gusher Coolant pumps are always ready to go to work. Pre-lubricated heavy-duty ball bearings, electronically balanced rotating assembly, with no metal-to-metal contact within the pump, assure you of less maintenance care, longer life. Send for our illustrated catalog today.

**THE RUTHMAN MACHINERY CO.**



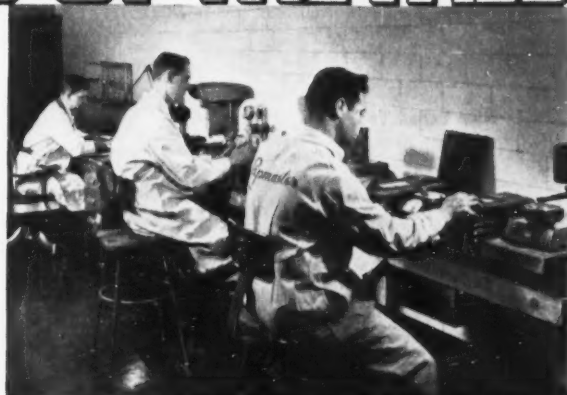
1807 READING ROAD

CINCINNATI 2, OHIO

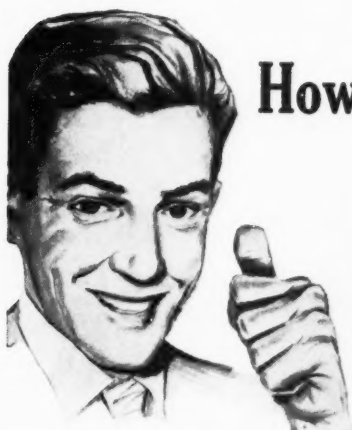
# FLAT LAPPING OF METALS



A view of our experimental lapping laboratory. Note how Lapmaster in foreground provides complete accessibility for loading and unloading work. In 1953 we proved to more than 200 manufacturers that lapping was profitable and solved their problems.



Our lapping laboratory is also equipped with the finest checking instruments including surface analyzers, monochromatic lights and Sheffield and Swedish gauges to insure an accurate report of every experimental job.



## How to find out if you need...

**Precision Flatness,  
Finish and Parallelity in  
Production Quantities**

## and how to get it

Over 500 manufacturers of industrial equipment including pumps, compressors, valves and controls plus many of the largest automotive and aircraft plants have found production lapping a great time and money saver in their operations. In many cases gaskets between mating surfaces have been eliminated, while in others a closer tolerance has brought about a tremendous improvement in product performance. The extreme high production accuracy of the Lapmaster (Micro-inch finishes of 2 to 3 RMS—surface flatness to less than .00001" when required) have amazed and sold many production men. This accuracy has been definitely proven on practically all materials including cast iron, steel, stainless steel, aluminum, brass, carbon, ceramics, plastics and sintered metals.

### **Our Lapping Laboratory Is At Your Service**

There is one sure way to find out if lapping is practical and profitable for you with no strings attached. We invite you to send us a few sample parts including surface finish specifica-

tions and approximate production requirements. The parts will be lapped in our laboratory shown above and returned to you with complete facts including data on number of finished parts per hour and recommended Lapmaster size to do the work. Many companies, large and small, have already taken advantage of this free service. In a majority of cases the Lapmaster has proven its use. Why not find out for *yourself* today.

### **Additional Data**

on the Lapmaster is available on request, also new information on Measuring Flatness. Write for your copies today.

Crane Packing Company, Dept. M-6,  
183: Cuyler Ave., Chicago 13, Ill.  
In Canada: Crane Packing Company,  
Ltd., 617 Parkdale Ave., North,  
Hamilton, Ont., Canada.



*\*Protected by U.S. and Foreign Patents*

**JOHN CRANE**

# CRANE PACKING COMPANY



Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
 Summerill Tubing Co. Div. Columbia Steel & Shafting Co., P. O. Box 1557, Pittsburgh 30, Pa.  
 Timken Roller Bearing Co., Canton, Ohio.  
 U. S. Steel Corp., (American Steel & Wire Co. Div.) 436 7th Ave., Pittsburgh, Pa.  
 Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.

Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
 Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
 Timken Roller Bearing Co., Canton, Ohio.  
 Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.

U. S. Steel Corp. (American Steel & Wire Co. Div., Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.

### STEEL, High Speed Tool

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Armstrong Bros. Tool Co., 5200 Armstrong Ave., Chicago, Ill.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Carpenter Steel Co., Reading, Pa.  
 Columbia Tool Steel Co., Lincoln Hwy. & State St., Chicago Heights, Ill.  
 Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
 Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
 Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
 Vanadium Alloys Steel Co., Latrobe, Pa.  
 Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.

### STEEL, Machine

Bethlehem Steel Co., Bethlehem, Pa.  
 Carpenter Steel Co., Reading, Pa.  
 Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.

### STEEL, Stainless

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 American Steel & Wire Co., Div. U. S. Steel Corp., Rockefeller Bldg., Cleveland, Ohio.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Carpenter Steel Co., Reading, Pa.  
 Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
 Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
 Timken Roller Bearing Co., Canton, Ohio.  
 U. S. Steel Corp. (American Steel & Wire Co. Div. Carnegie-Illinois Steel Corp. Div.), 436 7th Ave., Pittsburgh, Pa.  
 Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.

### STEEL, Strip and Sheet

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 American Steel & Wire Co., Div. U. S. Steel Corp., Rockefeller Bldg., Cleveland, Ohio.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
 Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.

### STEEL, Tool and Die

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Carpenters Steel Co., Reading, Pa.  
 Columbia Tool Steel Co., Lincoln Hwy. & State St., Chicago Heights, Ill.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
 Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
 Vanadium Alloys Steel Co., Latrobe, Pa.

### STEEL, Zinc, Tin and Copper Coated Strip

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

### STEEL ALLOYS

See Alloys, Steel

### STEEL BARS

See Bars, Steel

### STEEL STOCK GROUND FLAT

Brown & Sharpe Mfg. Co., Providence, R. I.  
 Starrett, The L. S., Co., Athol, Mass.  
 Summerill Tubing Co., Div. Columbia Steel & Shafting Co., P. O. Box 1557, Pittsburgh 30, Pa.

### STELLITE

Haynes Stellite Div., Union Carbide & Carbon Corp. (Alloy), 30 E. 42nd St., New York, N. Y.

### STOCKS, Die

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
 Butterfield Div., Union Twist Drill Co., Derby Line, Vt.  
 Card, S. W., Mfg. Co., Div. of Union Twist Drill Co., Mansfield, Mass.  
 Greenfield Tap & Die Corp., Greenfield, Mass.  
 Pratt & Whitney, West Hartford 1, Conn.

### STONES, Oil or Sharpening

Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.  
 Norton Co., 1 New Bond St., Worcester 6, Mass.

### STOOLS

Standard Pressed Steel Co., Jenkintown, Pa.

### STRAIGHTEDGES

Starrett, The L. S., Co., Athol, Mass.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.

### STRAIGHTENERS, Flat Stock and Wire

U. S. Tool Co., Inc., 255 North 18th St., Am-  
 pere, N. J.

### STRAIGHTENING MACHINERY

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.  
 Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.  
 Chambersburg Engrg. Co., Chambersburg, Pa.  
 Colonial Broach Co., P.O. Box 37, Harper Sta., Detroit 13, Mich.  
 Consolidated Mch. Tool Corp., Rochester, N. Y.

(Continued on page 392)

## NOTICE

On April 19, 1954, upon consent of all the parties and without any trial or other proceedings, a Final Judgment was entered in the action in the United States District Court for the Eastern District of Michigan, Southern Division, entitled *United States v. The Cincinnati Milling Machine Co., Kearney & Trecker Corporation and Cincinnati Grinders Incorporated* (Civil No. 13401). This judgment provides, among other things, that each of the companies, in so far as it has the power or authority so to do, grant to any applicant making written request therefor a non-exclusive and unrestricted license to make, use and vend milling machines\* under any, some or all of the issued patents\*\* owned or controlled by it at the date of entry of the judgment. Such license may provide for the payment by licensees of reasonable and non-discriminatory royalties, to be determined by the Court if the company and the applicant are unable to agree upon the amount thereof. The judgment is on file in the Office of the Clerk of the United States District Court for the Eastern District of Michigan, Southern Division, Detroit, Michigan, where it may be inspected during business hours.

### THE CINCINNATI MILLING MACHINE CO. CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

\*As defined in the Final Judgment, "milling machine" means (a) a power operated metal cutting machine tool which uses a rotating multi-toothed, hard metal edged cutter to shape surfaces by removing metal in the form of chips, such as, for example but not by way of limitation, machine tools of the types listed in Standard Commodity Classification Code No. 3417, published by the Munitions Board Cataloging Agency, in the 1951 revision of *Directory of Metal Working Machinery* and (b) devices and parts used or suitable for use therewith and attached or intended to be attached thereto, including pattern contacting mechanisms which follow and thereby automatically reproduce the shape and form of a pattern or model on a workpiece.

\*\*As defined in the Final Judgment, "patents" means United States Letters Patent, including reissues and extensions thereof, relating, but only in so far as they relate, to milling machines; a list of patents required to be licensed is attached to the Judgment.



# HEAVY LOAD / LIGHT WORK

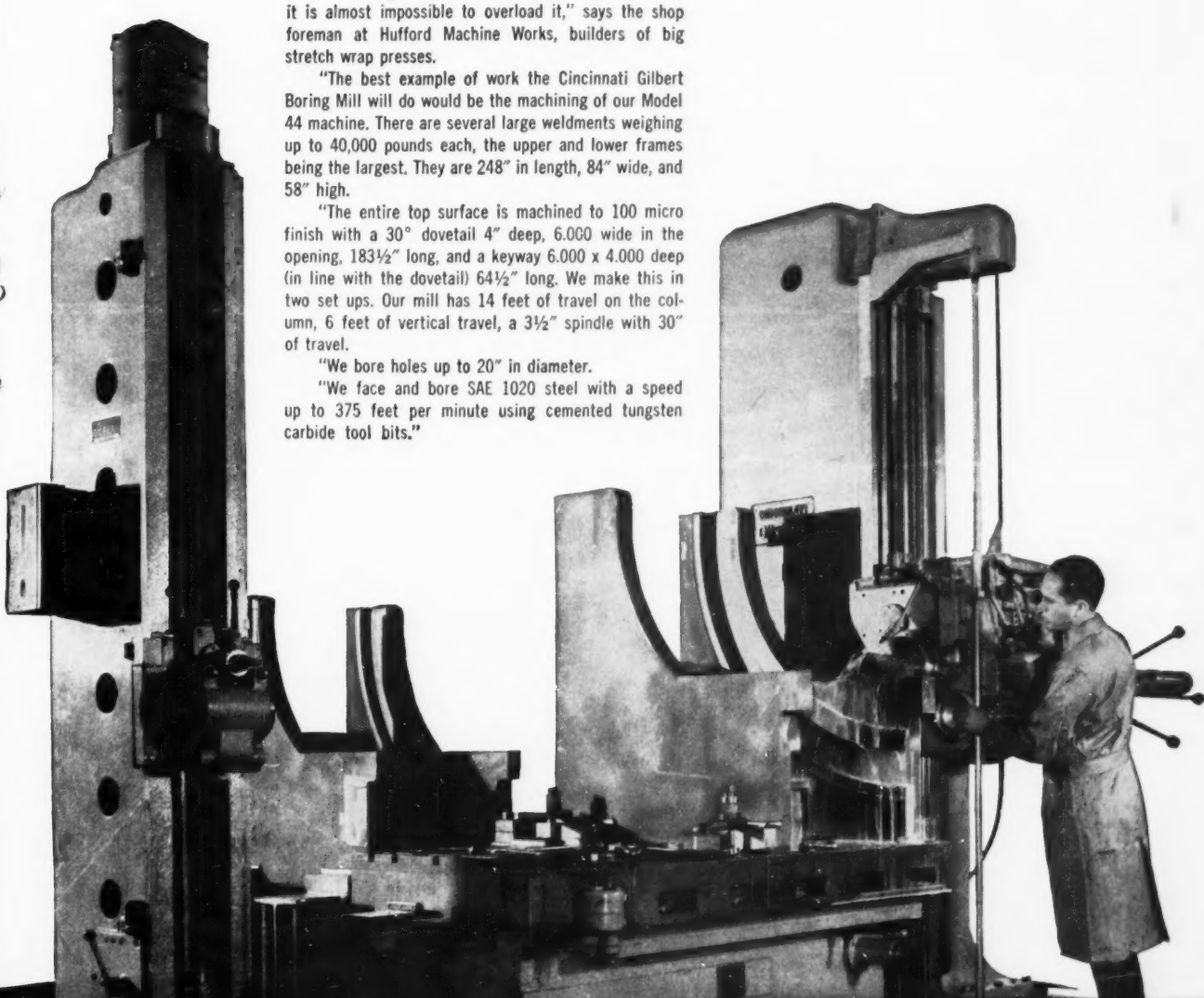
"The thing I like about the Cincinnati Gilbert is that it is almost impossible to overload it," says the shop foreman at Hufford Machine Works, builders of big stretch wrap presses.

"The best example of work the Cincinnati Gilbert Boring Mill will do would be the machining of our Model 44 machine. There are several large weldments weighing up to 40,000 pounds each, the upper and lower frames being the largest. They are 248" in length, 84" wide, and 58" high.

"The entire top surface is machined to 100 micro finish with a 30" dovetail 4" deep, 6.000 wide in the opening, 183½" long, and a keyway 6.000 x 4.000 deep (in line with the dovetail) 64½" long. We make this in two set ups. Our mill has 14 feet of travel on the column, 6 feet of vertical travel, a 3½" spindle with 30" of travel.

"We bore holes up to 20" in diameter.

"We face and bore SAE 1020 steel with a speed up to 375 feet per minute using cemented tungsten carbide tool bits."

A black and white photograph of a large industrial boring mill. The machine is a floor-type machine with a sliding table. A worker in a light-colored shirt and dark trousers is standing to the right of the machine, operating it. The machine has a large vertical column and a horizontal spindle. The background is dark, and the machine is the central focus.

Centralized controls, frictionless response, maximum flow of power from motor to tool make light work of heavy loads on a Gilbert. Hufford uses a floor type machine with sliding table. Many other arrangements are available. Write for literature on these versatile machines.

## GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO

Hannfin Corp., 1101 S. Kilbourn Ave., Chicago, Ill.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.  
 Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.  
 Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.  
 Springfield Mch. Tool Co., Springfield, Ohio.  
 Watson-Stillman Co., Div. H. K. Porter Co., Inc., Roselle, N. J.

**STRIPPING UNITS, Die**

Wales-Strippit Corp., N. Tonawanda, N. Y.

**STUD SETTERS**

Errington Mechanical Laboratory Inc., 24 Norwood Ave., Stapleton, S. I., N. Y.  
 Procnur Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.

**SUB-PRESSES**

Waltham Machine Works, Newton St., Waltham, Mass.

**SUPERFINISHING MACHINES**

Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.

**SURFACE PLATES**

See Plates, Surface

**SWAGING MACHINES**

Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.  
 Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
 Torrington Co., Torrington, Conn.

**SWITCHES**

Allen-Bradley Co., 1326 S. 2nd St., Milwaukee, Wis.  
 Central Products, Inc., (Waterproof and Thermal), 306 Sussex St., Harrison, N. J.  
 General Electric Co., Schenectady, N. Y.  
 National Acme Co., 170 E. 131st St., Cleveland, Ohio.

**TACHOMETERS**

Scherr, George Co., Inc., 200 Lafayette St., New York 12, N. Y.

**TAPER PINS, Standard**

Almetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y. (Stainless Steel only).  
 Chicago Screw Co., Bellwood, Ill.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Gillen, John, Co., Inc., 2540 S. 50th Ave., Cicero 50, Ill.  
 Pratt & Whitney, West Hartford 1, Conn.

**TAP HOLDERS**

Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34, Cal.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Errington Mechanical Laboratory, Inc., 24 Norwood Ave., Stapleton, S. I., N. Y.  
 McCrosky Tool Co., 1938 Thomas St., Meadville, Pa.  
 Procnur Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.  
 Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill.

**TAPPING ATTACHMENTS AND DEVICES**

Avey Drilling Mach. Co., 26 E. Third St., Covington, Ky.  
 Baker Bros., Inc., Station F, P.O. Box 101, Toledo 10, Ohio.  
 Baptist Machine Co., Inc., 36 Ludlow St., Stamford, Conn.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Buhr Mch. Tool Co., 835 Green St., Ann Arbor, Mich.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Errington Mechanical Laboratory, Inc., 24 Norwood Ave., Stapleton, S. I., N. Y.  
 Etco Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.  
 Jarvis, Chas. L., Co., Middletown, Conn.  
 Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.  
 McCrosky Tool Corp., 1938 Thomas St., Meadville, Pa.  
 Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
 Procnur Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.  
 Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
 Thriftmaster Products Corp., 1076 N. Plum St., Lancaster, Pa.

**TAPPING MACHINES**

Avey Drilling Mach. Co., 26 E. Third St., Covington, Ky.  
 Baker Bros., Inc., Station F, P.O. Box 101, Toledo 10, Ohio.  
 Barnes Drill Co., 814 Chestnut, Rockford, Ill.  
 Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.  
 Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.  
 Bodine Corp., 317 Mt. Grove St., Bridgeport, Conn.  
 Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.  
 Buhr Mch. Tool Co., 835 Green St., Ann Arbor, Mich.  
 Challenge Mchry. Co., Grand Haven, Mich.  
 Cleveland Tapping Machine Co., Canton 6, Ohio.  
 Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
 Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.  
 Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill.  
 Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 Jarvis, Chas. L., Co., Middletown, Conn.  
 Kaufman Manufacturing Co., Manitowoc, Wis.  
 Kingsbury Mch. Tool Corp., Keene, N. H.  
 Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.  
 Moline Tool Co., 102 20th St., Moline, Ill.  
 Morris Machine Tool Co., Inc., 946-M Harriet St., Cincinnati 3, Ohio.  
 National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
 National Automatic Tool Co., Inc., S. 7th and N. Sts., Richmond, Ind.  
 Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich.  
 Procnur Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.  
 Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
 Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

**TAPPING MACHINES, Nut**

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
 National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.  
 Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.

**TAPS**

Besly-Welles Corp., Beloit, Wis.  
 Butterfield Div., Union Twist Drill Co., Derby Line, Vt.  
 Card, S. W., Mfg. Co., Div. Union Twist Drill Co., Mansfield, Mass.  
 Continental Tool Works, Div. Ex-Cell-O Corp., Detroit 32, Mich.  
 Detroit Tap & Tool Co., 8615 E. 8 Mile Rd., Base Line, Mich.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Geometric Tool Co., Westville Station, New Haven 15, Conn.  
 Greenfield Tap & Die Corp., Greenfield, Mass.  
 Iroquois Corp., RFD 4 Box 331, 1800 E. 11 Mile Rd., Royal Oak, Mich.

(Continued on page 394)



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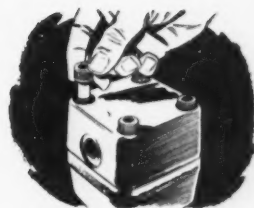


SOCKET SCREW DIVISION

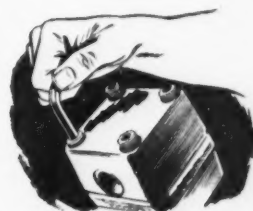


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The knurling on the head of the screw permits faster assembly, because it provides a slip-proof grip.



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UNBRAKOS—made of heat treated alloy steel—have fully formed threads, Class 3 fit; controlled fillet and continuous grain flow for strength. Supplied in standard sizes from # 4 to 1".



MACHINERY, June, 1954—393

Landis Mch. Co. (Solid Adjustable), Waynesboro, Pa.  
 Morse Twist Drill & Mach. Co., New Bedford, Mass.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Winter Bros. Co., Rochester, Mich.  
 Wood & Spencer Co., 1930 E. 61st St., Cleveland, Ohio.

### TAPS, Collapsing

Geometric Tool Co., Westville Station, New Haven 15, Conn.  
 Landis Mch. Co., Waynesboro, Pa.  
 National Acme Co., 170 E. 131st St., Cleveland, Ohio.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.

### THREAD CUTTING MACHINERY

Brown & Sharpe Mfg. Co., Providence, R. I.  
 Cosa Corp., 405 Lexington Ave., New York 17, N. Y.  
 Coulter, James, Machine Co., Bridgeport 5 Conn.  
 Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.  
 Eastern Mch. Screw Corp., New Haven, Conn.  
 Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Grant Mfg. & Mch. Co., 90 Silliman St., Bridgeport 5, Conn.  
 Hanson-Whitney Co., Div. Whitney Chain Co., Hartford, Conn.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
 Hirschmann Co., Carl, 30 Park Ave., Manhasset, N. Y.  
 Kauffman Manufacturing Co., Manitowoc, Wis.  
 Landis Mch. Co., Waynesboro, Pa.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Proconier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
 Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.  
 Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.

### THREAD CUTTING TOOLS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
 Detroit Tap & Tool Co., 8615 E. 8 Mile Rd., Base Line, Mich.  
 Eastern Mch. Screw Corp., New Haven, Conn.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.  
 Fellows Gear Shaper Co., 78 River St., Springfield, Vt.  
 Geometric Tool Co., Westville Station, New Haven 15, Conn.  
 Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
 Landis Mch. Co., Waynesboro, Pa.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Taft-Peirce Mfg. Co., Woonsocket, R. I.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

### THREAD GAGES

See Gages, Thread.

### THREAD GRINDING MACHINES

See Grinding Machines, Thread

### THREAD MILLING MACHINES

Coulter, James, Machine Co., Bridgeport 5, Conn.  
 Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
 Hanson-Whitney Co., Div. Whitney Chain Co., Hartford, Conn.  
 Pratt & Whitney, West Hartford 1, Conn.  
 Sheffield Corp., 721 Springfield, Dayton, Ohio.  
 Waltham Machine Works, Newton St., Waltham, Mass.

### THREAD ROLLING HEADS

National Acme Co., 170 E. 131st St., Cleveland, Ohio.

### THREAD ROLLING MACHINES

Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.  
 Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.  
 Reed Rolled Thread Die Co., P. O. Box 350, Worcester 1, Mass.

### TIN AND TERNEPLATES

Bethlehem Steel Co., Bethlehem, Pa.  
 Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.  
 U. S. Steel Corp., (Carnegie-Illinois Steel Corp., Div. Columbia Steel Co. Div. Tennessee Coal Iron & R. R. Co., Div.), 436 7th Ave., Pittsburgh, Pa.

### TOOL BITS, High Speed Steel

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
 Besley-Welles Corp., Beloit, Wis.  
 Carpenter Steel Co., Reading, Pa.  
 Columbia Tool Steel Co., Lincoln Hwy. & State St., Chicago Heights, Ill.  
 Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
 Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.  
 Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
 Vanadium Alloys Steel Co., Latrobe, Pa.  
 Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

### TOOL BITS, Special Alloy

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.  
 DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.  
 Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.  
 Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.  
 Kennametal, Inc., Latrobe, Pa.  
 Vanadium Alloys Steel Co., Latrobe, Pa.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

### TOOL GRINDERS

See Grinding Machines for Sharpening, Turning and Planning Tools.

### TOOL GRINDING ATTACHMENTS

Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit, Mich.

### TOOL HOLDERS

Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.  
 Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.  
 Beaver Tool & Engineering Corp., 2850 Rochester Rd., Box 429, Royal Oak, Mich.  
 Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34, Cal.  
 Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.  
 Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.  
 Milholland, W. K., Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind.  
 OK Tool Co., Milford, N. H.  
 Portage Double Quick Tool Co., 1063 Sweitzer Ave., Akron 11, Ohio.  
 R and L Tools, 1825 Bristol St., Philadelphia 40, Pa.  
 Scully-Jones & Co., 1903 Rockwell St., Chicago 8, Ill. (Turret)  
 South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.  
 Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.  
 Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

(Continued on page 396)



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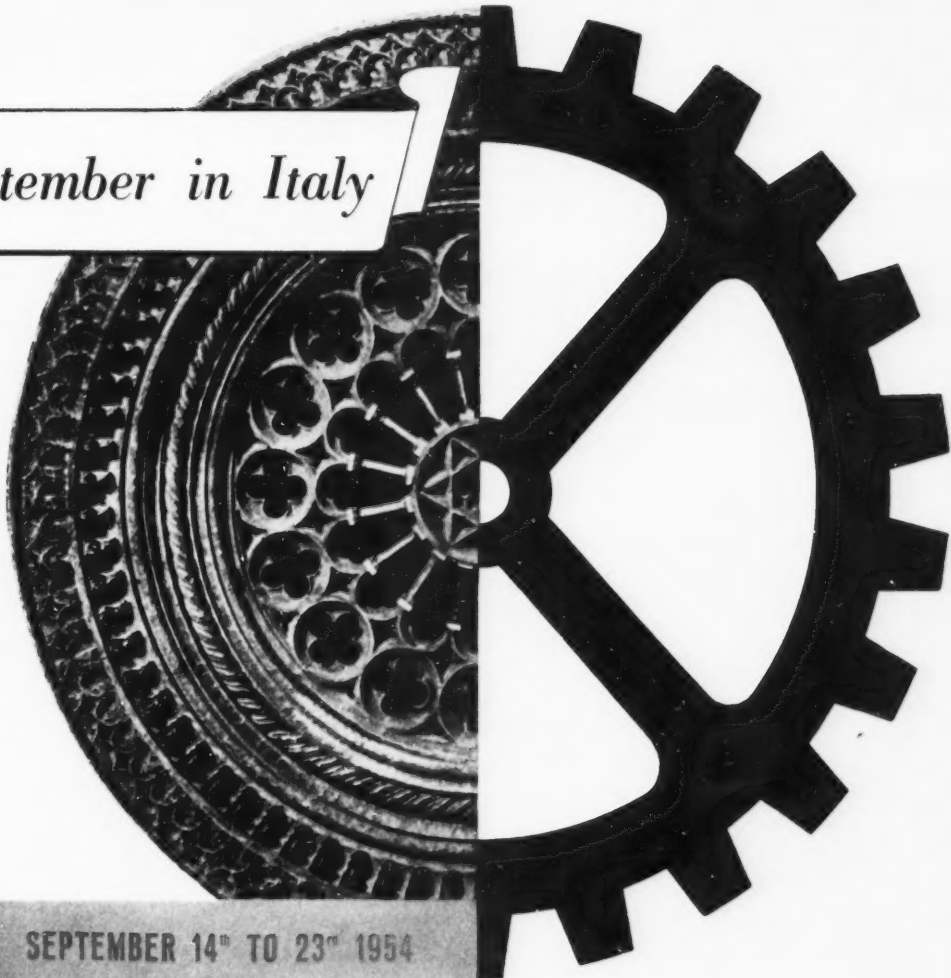
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 Gaging  
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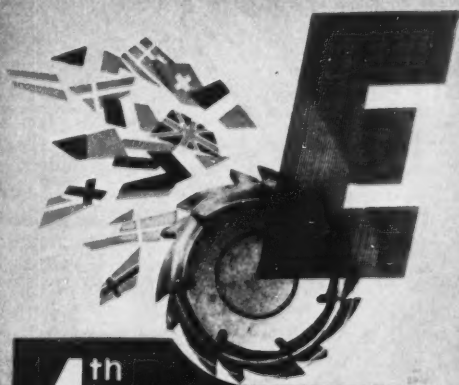
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*September in Italy*

SEPTEMBER 14<sup>th</sup> TO 23<sup>rd</sup> 1954



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**TOOLMAKERS' INSTRUMENTS**

Ames, B. C. Co., Waltham 54, Mass.  
 Baptist Machine Co., Inc., 36 Ludlow St.,  
 Stamford, Conn.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Scherr, George, Co., Inc., 200 Lafayette St.,  
 New York 12, N. Y.  
 Starratt, The L. S. Co., Athol, Mass.  
 Taff-Peirce Mfg. Co., Woonsocket, R. I.

**TOOL STEEL**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Carpenter Steel Co., Reading, Pa.  
 Columbia Tool Steel Co., Lincoln Hwy. & State  
 St., Chicago Heights, Ill.  
 Crucible Steel Co. of America, Chrysler Bldg.,  
 New York, N. Y.  
 DaAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh  
 30, Pa.  
 Republic Steel Corp., Republic Bldg., Cleveland  
 1, Ohio.  
 Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,  
 Chicago 18, Ill.  
 Vanadium Alloys Steel Co., Latrobe, Pa.

**TOOLS, Carbide-Tipped**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Atrax Co., Newington, Conn.  
 Beaver Tool & Engineering Corp., 2850  
 Rochester Rd., Box 429, Royal Oak, Mich.  
 Carboly Dept., General Electric Co., Box 237,  
 Roosevelt Park Annex, Detroit 32, Mich.  
 Chicago-Latrobe Twist Drill Works, 411 W.  
 Ontario St., Chicago, Ill.  
 Cleveland Twist Drill Co., 1242 E. 49th St.,  
 Cleveland, Ohio.  
 Colonial Broach Co., Detroit 13, Mich.  
 DaAll Co., 254 N. Laurel Ave., Des Plaines, Ill.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit  
 32, Mich.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh  
 30, Pa.  
 Gairing Tool Co., 21225 Hoover Rd., Detroit  
 32, Mich.  
 Gorham Tool Co., 14400 Woodrow Wilson,  
 Detroit, Mich.  
 Kennametal Inc., Latrobe, Pa.  
 McCroskey Tool Corp., 1938 Thomas St., Mead-  
 ville, Pa.  
 Metal Carbides Corp., Youngstown, Ohio.  
 Newcomer Products, Latrobe, Pa.  
 OK Tool Co., Millard, N. H.  
 Super Tool Co., 21650 Hoover Rd., Detroit 13,  
 Mich.  
 Union Twist Drill Co., Athol, Mass.  
 Wesson Co., 1220 Woodward Heights Blvd.,  
 Ferndale, Mich.  
 Whitman & Barnes, 40600 Plymouth Rd.,  
 Plymouth, Mich.  
 Willey's Carbide Tool Co., 1340 W. Vernor  
 Hwy., Detroit 1, Mich.

**TOOLS, Lathe, Shaper and Planer**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Apex Tool & Cutter Co., Inc., 237 Canal St.,  
 Shelton, Conn.  
 Armstrong Bros. Tool Co., 5200 W. Armstrong  
 Ave., Chicago, Ill.  
 Bullard Co., Brewster St., Bridgeport 2, Conn.  
 Carboly Dept., General Electric Co., Box  
 237, Roosevelt Park Annex, Detroit 32, Mich.  
 Firth Sterling Inc., 3113 Forbes St., Pittsburgh  
 30, Pa.  
 Gorham Tool Co., 14400 Woodrow Wilson,  
 Detroit, Mich.  
 Halpern, Wm., Co., Inc., 100 Stevens Ave.,  
 Mt. Vernon, N. Y.  
 Haynes Stellite Div., Union Carbide & Carbon  
 Corp., 30 E. 42nd St., New York, N. Y.  
 Kennametal Inc., Latrobe, Pa.  
 Northwestern Tool & Engrg. Co., 117 Hollier,  
 Dayton, Ohio.  
 OK Tool Co., Millard, N. H.  
 South Bend Lathe Works, Inc., 425 E. Madison  
 St., South Bend, Ind.  
 Super Tool Co., 21650 Hoover Road, Detroit  
 13, Mich.  
 Warner & Swasey Co., 5701 Carnegie Ave.,  
 Cleveland, Ohio.  
 Wesson Co., 1220 Woodward Heights Blvd.,  
 Ferndale, Mich.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo  
 7, N. Y.

**TRANSFER MACHINES, Automatic**

Baird Machine Co., 1700 Stratford Ave., Strat-  
 ford, Conn.  
 Barnes Drill Co., 814 Chestnut St., Rockford,  
 Ill.  
 Barnes, W. F. & John, Co., 201 S. Water St.,  
 Rockford, Ill.

Colonial Broach Co., P. O. Box 37, Harper  
 Sta., Detroit 13, Mich.  
 Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.  
 Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit  
 32, Mich.  
 Peerless Production Corp., 19449 Glendale  
 Ave., Detroit 23, Mich.  
 Sundstrand Mch. Tool Co., 2531 11th St.,  
 Rockford, Ill.

**TRANSFORMERS**

General Electric Co., Schenectady, N. Y.

**TRANSMISSION, Variable Speed**

Link-Belt Co., 2045 W. Huntington Park Ave.,  
 Philadelphia 40, Pa.  
 Oilgear Co., 1560 W. Pierce St., Milwaukee 4.  
 Reliance Electric & Engrg. Co., 1047 Ivanhoe  
 Rd., Cleveland 10, Ohio.  
 Sundstrand Mch. Tool Co., 2531 11th St.,  
 Rockford, Ill.

**TUBE FLANGING MACHINES**

Grant Mfg. & Mch. Co., 90 Silliman St., Bridge-  
 port 5, Conn.

**TUBE FORMING AND WELDING  
MACHINES**

American Elec. Fusion Corp., 2606 Diversay  
 Ave., W., Chicago, Ill.  
 Yoder Co., 550 Walworth Ave., Cleveland.

**TUBE MILLS**

Abbey-Etna Co., 2422 Maplewood Ave., Toledo  
 10, Ohio.

**TUBING, Brass and Copper**

American Brass Co., 25 Broadway, New York,  
 N. Y.  
 Mueller Brass Co., Port Huron 35, Mich.  
 Revere Copper & Brass Inc., 230 Park Ave.,  
 New York, N. Y.

**TUBING, Flexible**

American Metal Hose Br. American Brass Co.,  
 25 Broadway, New York, N. Y.

**TUBING, Steel**

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.  
 Bethlehem Steel Co., Bethlehem, Pa.  
 Carpenter Steel Co., Reading, Pa.  
 National Tube Div. U. S. Steel Corp., 525 Wm.  
 Penn Place, Pittsburgh, Pa.  
 Republic Steel Corp., Steel & Tubes Div., Re-  
 public Bldg., Cleveland 1, Ohio.  
 Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,  
 Chicago 18, Ill.  
 Summerill Tubing Co., Div. Columbia Steel &  
 Shafting Co., P. O. Box 1557, Pittsburgh  
 30, Pa.  
 Timken Roller Bearing Co., Canton, Ohio.

**TWIST DRILLS**

See Drills, Twist

**UNIVERSAL JOINTS**

Baush Machine Tool Co., 156 Wesson Ave.,  
 Springfield 7, Mass.  
 Boston Gear Works, 3200 Main St., North  
 Quincy 71, Mass.  
 Gear Grinding Machine Co., 3901 Christopher  
 St., Detroit 11, Mich.

**VALVE CONTROLS**

Lehigh Foundries, Inc., 1500 Lehigh Dr.,  
 Easton, Pa.  
 Philadelphia Gear Works (Motorized), Erie Ave.  
 and G St., Philadelphia, Pa.

**VALVES, Air**

Hannifin Corp., 1101 S. Kilburn Ave., Chicago,  
 Ill.  
 Hunt, C. B. & Son, Inc., 1911 E. Pershing St.,  
 Salem, Ohio.  
 Kindt-Collins Co., 12653 Elmwood Ave., Cleve-  
 land 11, Ohio.  
 Lehigh Foundries, Inc., 1500 Lehigh Dr.,  
 Easton, Pa.  
 Mead Specialties Co., 4114 North Knox Ave.,  
 Chicago 41, Ill.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston  
 35, Mass.  
 Ross Operating Valve Co., 120 E. Golden Gate,  
 Detroit, Mich.

**VALVES, Hydraulic**

American Steel Foundries, Elmes Engrg. Div.,  
 Paddock Rd. and Tennessee Ave., Cincin-  
 nati, Ohio.  
 Baldwin-Lima-Hamilton Corp., Philadelphia 42,  
 Pa.  
 Baptist Machine Co., Inc., 36 Ludlow St.,  
 Stamford, Conn.  
 Barnes, John S. Corp., Rockford, Ill.  
 Denison Engrg. Co., 1160 Dublin St., Columbus  
 16, Ohio.  
 Hannifin Corp., 1101 S. Kilbourn Ave., Chi-  
 cago, Ill.  
 Hunt, C. B. & Son, Inc., 1911 E. Pershing St.,  
 Salem, Ohio.  
 Hydraulic Press Mfg. Co., 300 Lincoln Ave.,  
 Mt. Gilead, Ohio.  
 Lehigh Foundries, Inc., 1500 Lehigh Dr.,  
 Easton, Pa.  
 Logansports Machine Co., Inc., 810 Center  
 Ave., Logansport, Ind.  
 Oilgear Co., 1560 W. Pierce St., Milwaukee 4.  
 Rivett Lathe & Grinder, Inc., Brighton, Boston  
 35, Mass.  
 Sundstrand Mch. Tool Co., 2531 11th St.,  
 Rockford, Ill.  
 Vickers, Inc., 1402 Oakman Blvd., Detroit,  
 Mich.  
 Watson-Stillman Co., Div. H. K. Porter Co.,  
 Inc., Roselle, N. J.

**VALVES, Pneumatic**

Baptist Machine Co., Inc., 36 Ludlow St.,  
 Stamford, Conn.

**VIBRATION INSULATION**

American Felt Co., Glenville, Conn.

**VICES, Machine**

Armstrong-Blum Mfg. Co., 5700 W. Blooming-  
 dale Ave., Chicago, Ill.  
 Armstrong Bros. Tool Co., 5200 W. Armstrong  
 Ave., Chicago, Ill.  
 Brown & Sharpe Mfg. Co., Providence, R. I.  
 Delta Power Tool Div., Rockwell Mfg. Co.,  
 614G N. Lexington Ave., Pittsburgh 8, Pa.  
 Hannifin Corp., 1101 S. Kilbourn Ave., Chi-  
 cago, Ill.  
 Homstrand Inc., Larchmont, N. Y.  
 Logansports Machine Co., Inc., 810 Center  
 Ave., Logansport, Ind.  
 Producto Mch. Co., 990 Housatonic Ave.,  
 Bridgeport, Conn.  
 Skinner Chuck Co., 344 Church St., New Brit-  
 ain, Conn.  
 South Bend Lathe Works, Inc., 425 E. Madison  
 St., South Bend, Ind.  
 Universal Engineering Co., Frankenmuth 2,  
 Mich.

**VICES, Pipe**

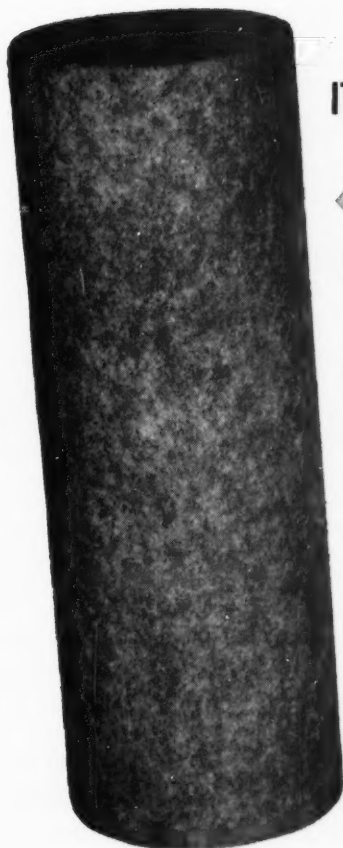
Armstrong Bros. Tool Co., 5200 W. Armstrong  
 Ave., Chicago, Ill.  
 Williams, J. H. & Co., 400 Vulcan St., Buffalo  
 7, N. Y.

**VICES, Planer and Shaper**

Brown & Sharpe Mfg. Co., Providence, R. I.  
 Cincinnati Shaper Co., Elam and Garrard  
 Aves., Cincinnati, Ohio.  
 Rockford Mch. Tool Co., 2500 Kishwaukee St.,  
 Rockford, Ill.  
 Skinner Chuck Co., 344 Church St., New Brit-  
 ain, Conn.  
 South Bend Lathe Works, Inc., 425 E. Madison  
 St., South Bend, Ind.

(Continued on page 398)

# Here's how **MICRO-KLEAN** *halves your filter cartridge replacement costs*



**ITS GRADUATED DENSITY  
IN DEPTH**

**INCREASES CAPACITY FOR DIRT  
ACCUMULATION IN CARTRIDGE**

**DOUBLES THE EFFECTIVE  
CARTRIDGE LIFE. That's how...**

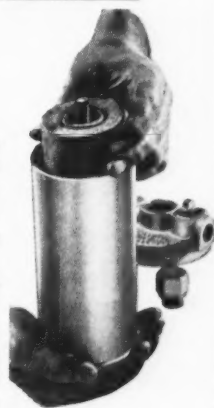
**IT CUTS CARTRIDGE  
REPLACEMENT COSTS  
IN HALF!**

In effect, every MICRO-KLEAN cartridge provides an almost infinite series of screens, ranging from relatively coarse on the outside down to 10 microns in the center.

Because of MICRO-KLEAN's graduated density, particles are trapped throughout the entire depth of the filter element, giving it twice the effective life of ordinary filter cartridges. Thus cartridge replacement costs are cut in half.

If you're looking for dependable, effective filtration at the lowest possible cost, Cuno's MICRO-KLEAN is your answer. You can get MICRO-KLEAN in densities of 10, 25, and 50 microns.

M. 3. D



**REMEMBER, IF YOU CAN PUMP IT, CUNO CAN FILTER IT**



**AUTO-KLEAN (disc-type) • MICRO-KLEAN (fibre cartridge) • FLO-KLEAN (wire-wound)**

For more information on products advertised, use Inquiry Card, page 245

## **LOW-COST FILTRATION FOR INDUSTRIAL PLANTS**

Fewer cartridge changes necessary  
with MICRO-KLEAN filters

More and more industrial plants are turning to Cuno MICRO-KLEAN filters for all their filtration requirements. Here's why:

Cartridge replacement costs are cut in half—because MICRO-KLEANS last twice as long as ordinary filter elements. They enjoy a "double life" because their unique cartridges provide so much greater dirt-holding capacity. Graduated density-in-depth traps contaminants throughout the entire depth of the filter element—rather than merely on the surface, as with conventional filters of uniform density. Each fibre of the MICRO-KLEAN cartridge is firmly bonded in place by resin impregnation and polymerization, to protect cartridge against channeling, rupture, shrinkage or distortion.

MICRO-KLEANS provide effective, low-pressure-drop filtration even on gravity or low pressure lines. And they can be installed on the low or high pressure side of pumps.

Cartridge changing is a matter of seconds, too. Only one nut need be removed.

Send the coupon today for more facts on MICRO-KLEAN filters for industrial fluids. We'll mail you the free MICRO-KLEAN bulletin, together with a filtration analysis form. If you'll have one of your engineers fill it out, we'll be able to recommend the filters that best meet your requirements.

M. 3. 20

Cuno Engineering Corporation  
Dept. 1320D South Vine Street, Meriden, Conn.

Please send me your filtration analysis form  
— and more information on MICRO-KLEAN for

(fluid)

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

**MACHINERY, June, 1954—397**



**VICES, Pneumatic**

Mead Specialties Co., 4114 North Knox Ave., Chicago 41, Ill.

**VOLTMETERS**

General Electric Co., Schenectady, N. Y.

**WASHERS, Lock**

Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y. (Stainless Steel only)

Eaton Mfg. Co., Reliance Div., 25 Charles Ave., S. E., Massillon, Ohio.

**WASHERS, Spring**

Allmetal Screw Products Co., Inc., 821 Stewart Ave., Garden City, N. Y. (Stainless Steel only)

Eaton Mfg. Co., Reliance Div., 25 Charles Ave., S. E., Massillon, Ohio.

**WELDING AND CUTTING EQUIPMENT****Oxyacetylene**

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York N. Y.

**WELDING AND CUTTING GAGES**

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.

**WELDING EQUIPMENT, Electric Arc**

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Expert Welding Machine Co., 17144 Mt. Elliott Ave., Detroit 12, Mich. General Electric Co., Schenectady, N. Y., 22801 St. Clair Ave., Cleveland, Ohio.

**WELDING EQUIPMENT, Electric, Spot, Butt, Seam, Etc.**

American Electric Fusion Corp., 2606 Diversey Ave., W. Chicago, Ill. Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Expert Welding Machine Co., 17144 Mt. Elliott Ave., Detroit 12, Mich. Federal Machine & Welder Co., Warren, Ohio.

**WELDMENTS**

Mohon, R. C. Co., Detroit 34, Mich. Peerless Production Corp., 19449 Glendale Ave., Detroit 23, Mich. Woods, A. C. & Co., Div. Kropp Forge Co., 1129 Harrison Ave., Rockford, Ill.

**WIPERS**

Scott Paper Co., Chester, Pa.

**WIRE**

American Steel & Wire Co., Div. U. S. Steel Corp., Rockefeller Bldg., Cleveland, Ohio. Bethlehem Steel Co., Bethlehem, Pa. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio. U. S. Steel Corp., (American Steel & Wire Co. Div. Columbia Steel Co. Div., Tennessee Coal Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.

**WIRE FORMING MACHINERY**

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

**WIRE NAIL MACHINERY**

Baird Machine Co., 1700 Stratford Ave., Stratford, Conn. Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio. National Mchry. Co., Greenfield and Stanton Sts., Tiffin, Ohio. Ryerson Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.

**WOODWORKING MACHINERY**

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa. Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill. Walker-Turner Div., Kearney & Trecker Corp., 900 North Ave., Plainfield, N. J.

**WORM DRIVES**

Cleveland Worm & Gear Co., 3249 E. 80th St., Cleveland, Ohio.

Cone-Drive Gear Div., Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Link-Belt Co., 2045 W. Huntington Park Ave., Philadelphia 40, Pa. Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio. Philadelphia Gear Works, Erie Ave., and G St., Philadelphia, Pa.

**WRENCHES**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill. Ingersoll-Rand Co. (Impact, Pneumatic, Electric), Phillipsburg, N. J. Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**WRENCHES, Detachable Socket**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill. Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**WRENCHES, Pipe**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.

**WRENCHES, Ratchet**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill. Keller Tool Co., Grand Haven, Mich. Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**WRENCHES, Tap**

Butterfield Div., Union Twist Drill Co., Derby Line, Vt. Card, S. W., Mfg. Co., Div. Union Twist Drill Co., Mansfield, Mass. Greenfield Tap & Die Corp., Greenfield, Mass. Pratt & Whitney, West Hartford, Conn.

**WRENCHES, Torque Measuring**

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill. Williams, J. H. & Co., 400 Vulcan St., Buffalo 7, N. Y.

**ZINC**

New Jersey Zinc Co., 160 Front St., New York, N. Y.

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### STEEL BLUE

**Stops Losses**  
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Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench: metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample  
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2303R North 11th St. • St. Louis 8, Mo.

## OIL GROOVING

**FLEXIBILITY  
AT HIGH SPEED  
LOW COST**



The Fischer Oil Groover cuts all types of grooves in bearings and shafts, continuous or relieved, straight or spiral—at any angle from parallel to perpendicular to the axis of work. Send samples for free grooving and cost estimates.

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**END NIGHT CLEANUP & MORNING REBLUING**



DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

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The Genuine **MAUSER** **VERNIER CALIPER**

IS NOW  
MADE OF **STAINLESS STEEL** THROUGHOUT



AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED

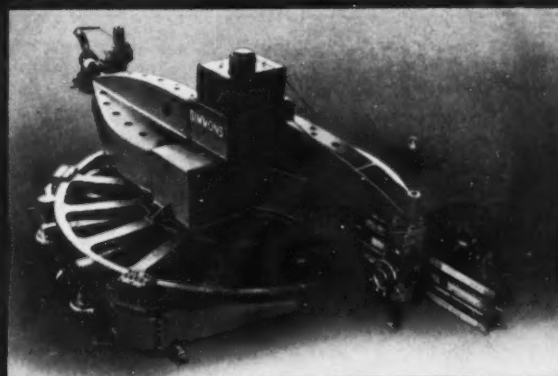
- HARDENED PHOSPHOR-BRONZE adjustable gk retails accuracy
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- 3 GRADUATIONS - 1/1000" - 1/128" - 1/16 mm in back

Request illustrated folder showing complete line of  
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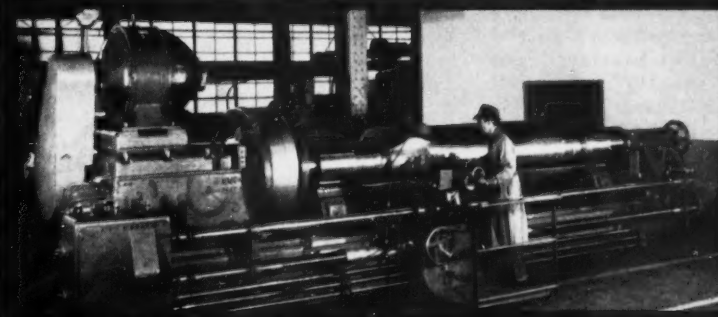
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## "Special Purpose" machine tools



↑ 36' Circular Boring Mill, designed and built by Simmons for gear cutting of 24' turret ring forgings, features unusual indexing method.



← Lathe cuts indentations in tough alloy steel rolls used to produce steel safety floor plate. Simmons designed and built the tool for a leading steel producer.

Unusual Pit Lathe was especially designed for the machining of large dryer rolls. Lathe handles rolls up to 14' diameter on 30' centers.

## cut your costs permanently

—take load off standard tools—  
eliminate machining steps and operators



Labor costs are up...profit margins slimmer.  
What's the answer? Just this:

*More and more economy-minded managements are finding "special purpose" machine tools the one way to cut costs permanently.*

Simmons Machine Tool, uniquely geared to produce the large special machine tools that other builders shy from, is currently helping America's blue-chip metalworking plants modernize and specialize their production lines.

Our engineers work closely with theirs, determine the problem and how it can be solved. The answer may be a completely new tool, a battery of such tools, or in the modernizing and adapting of existing tools.

If you think—or even suspect—that a "special-purpose" machine tool might do your work better, quicker and cheaper, find out. Write, wire or phone Simmons today. We'll study your problem and make a quick recommendation.

SIMMONS MACHINE TOOL CORPORATION  
1600 North Broadway, Albany 1, N. Y.  
New York Office: 50 E. 42nd St.

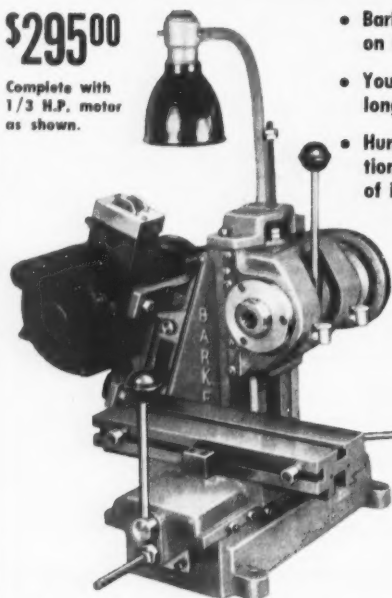
## Simmons...

for the large special machine  
tools that others seldom build

# BARKER BENCH TYPE MILL Built Right • Priced Right

**\$295<sup>00</sup>**

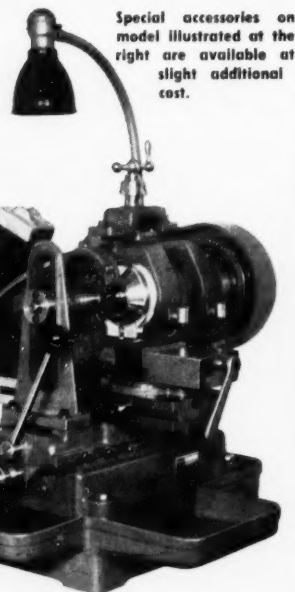
Complete with  
1/3 H.P. motor  
as shown.



- Barker Mills will do jobs that cannot be done on large machines.
- You can hold close tolerances consistently on long run jobs.
- Hundreds in use from coast to coast by nationally known manufacturers in a wide range of industries.

• General Specifications:  
Table 4" x 12" with 5" travel—head and spindle equipped with pre-loaded ball bearings—Head travel 3 1/4". Saddle travel 3". Speeds from 214 to 6000 R.P.M. Weight 160 lbs.

- If you have small parts milling jobs it will be wise to check into the possibilities of the Barker Mill.



Special accessories on model illustrated at the right are available at slight additional cost.

WRITE TODAY FOR LITERATURE and accessory sheet showing various operations with complete information.

**BARKER ENGINEERING COMPANY**

A Barker equipped with coolant pan, motor driven pump, arbor support, spindle coolant shield, cutter guard and 3 1/4" vise.

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# Rowbottom CAMS

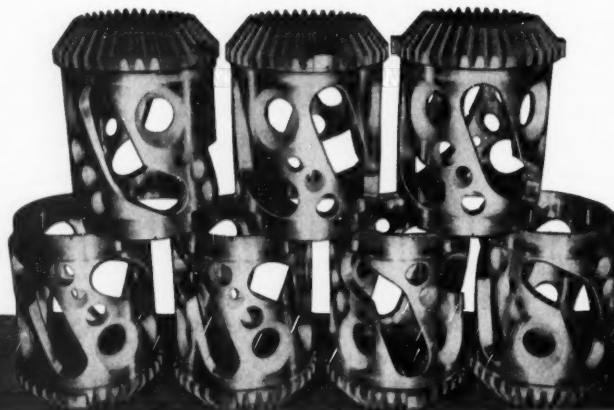
You specify . . . we'll produce quickly, economically . . . in any quantity

When you need cams, you need ROWBOTTOM Cam Production Service . . . to furnish cams exactly to your specifications in whatever quantities needed to keep pace with your production schedules. You can make Rowbottom your "Cam Department" for design as well as for production. You can depend on our rigid inspection to assure strictest adherence to every detail including design, material and tolerances.

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Rowbottom also builds Cam Milling and Cam Grinding Machines for producing all types of cams including hardened and ground. Ask for illustrated literature.

(Right): Propeller Cams produced by Rowbottom.



**THE ROWBOTTOM MACHINE COMPANY.**  
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**THE AIRCRAFT INDUSTRY** requires a mobile source of oil-absorbing wiping material. Wipers must be strong for heavy work, soft for polishing fine metals.



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Scott Wipers now make wiping a scientific step in production—measurable in terms of cost,

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**THE HANDS OF PRODUCTION**—your most important tools—are protected by disposable Scott Wipers. Harmful filings and chips are thrown away along with the used wiper.

**Scott Industrial Wipers—Another Scott Product that is changing America's way of doing things.**





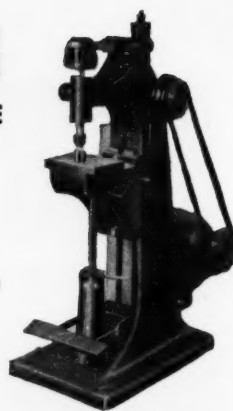
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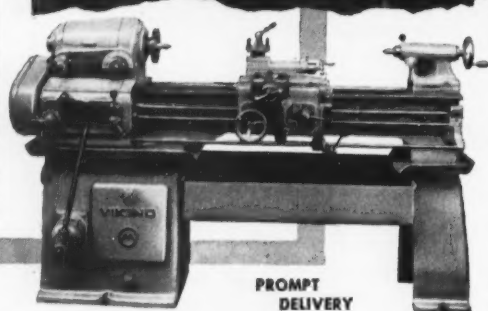
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**INFINITE SPEED CONTROL  
WITHIN RANGE**

**VIKING 13 $\frac{3}{4}$ " ENGINE LATHE**



PROMPT  
DELIVERY

A patented variable speed unit enables the operator to select any required speed from 35 to 1200 RPM by the movement of a single lever. The headstock is designed with anti-friction bearings and is of rigid construction with hardened and ground spindle. All gears and spline shafts are hardened to insure long life. Measurements are in INCHES AND DECIMALS.

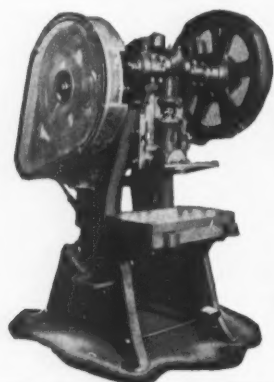
**PARTIAL  
SPECIFICATIONS**

Distance between centers	30", 40", 60"
Swing over bed	13 $\frac{3}{4}$ "
Spindle speeds (RPM)	35-1200
Motor	3 HP

For complete details write to Dept. M-3.

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*for machine tools!*

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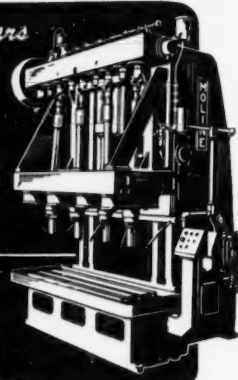
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1-Ton Power Bench Type



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Powerful, Dependable, Economical.  
For light work—stamping, forming,  
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Overall height 17 $\frac{1}{2}$ "... Base size 8 $\frac{1}{2}$ "  
x 8 $\frac{1}{2}$ "... Die bed 5 $\frac{1}{2}$ " x 8 $\frac{1}{2}$ "...  
Ram face 1 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ "... Ram stroke  
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... sturdy, single pin, non-repeat hand  
lever clutch, V-belt drive, Weight 105  
lbs. Requires only  $\frac{1}{4}$  to  $\frac{1}{2}$  H.P. Motor.  
This machine of a thousand uses! Adequate  
for many types of work now done on  
large presses at greater expense.

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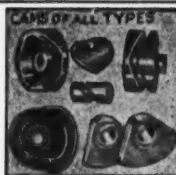
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MADE TO YOUR SPEC.

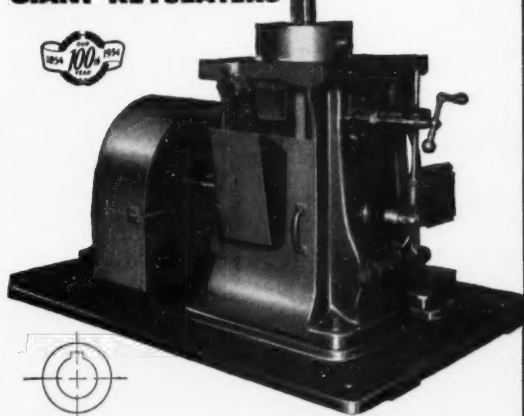
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# M & M

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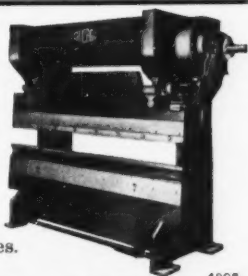
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### 43 Standard Sizes

DIES Punching and Forming for All Makes and Sizes of Press Brakes.



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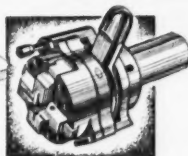
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## New QDB series

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Gerotor has redesigned its series of small capacity pumps to give even more . . .

- **FLEXIBILITY**—the QDB can be operated in either clockwise or counterclockwise direction by simply changing the position of one internal plug!
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If you have need for pumps in the QDB range, call on Gerotor.

Gerotor makes a complete line of hydraulic pumps in ranges from .4 g.p.m. to 40 g.p.m. The Gerotor engineers can help you solve your hydraulic pump problems. Write for *free literature* and full particulars.

Check this capacity table . . .

Type	Delivery g.p.m.—1800 r.p.m.				
	Discharge Pressure p.s.i.				
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QDB .4	.42	.40	.38	.35	.31
QDB .75	.84	.80	.78	.73	.66
QDB 1.5	1.67	1.62	1.57	1.50	1.42

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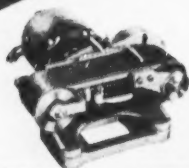
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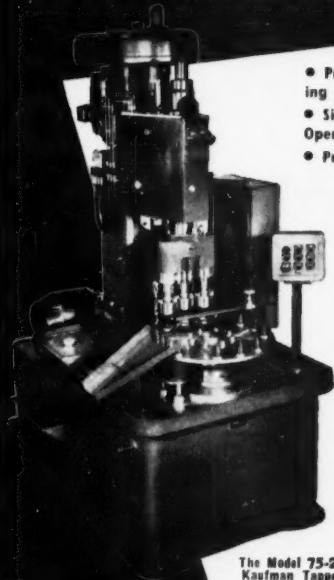
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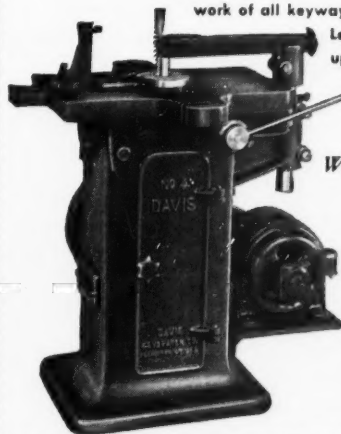
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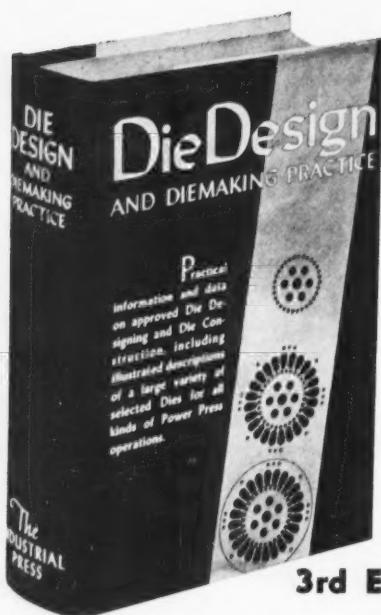
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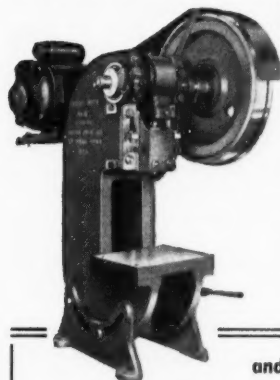
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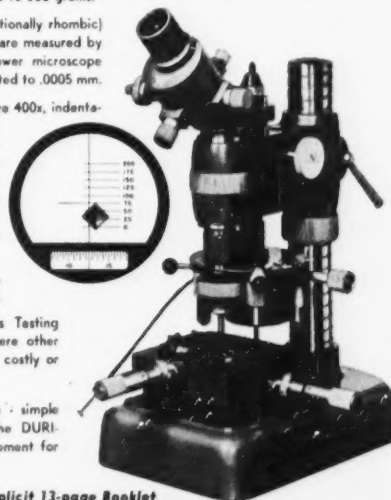
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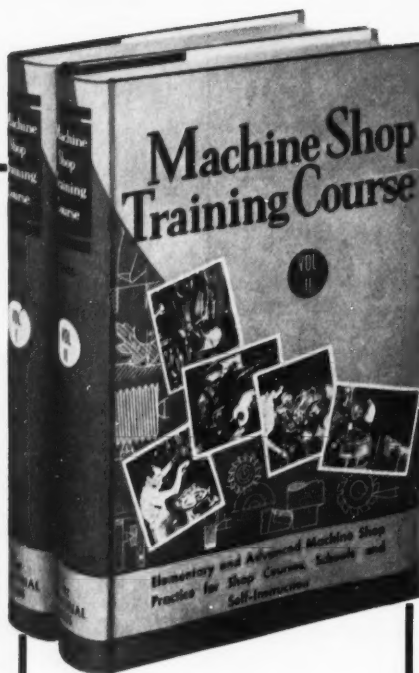


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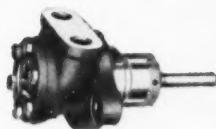
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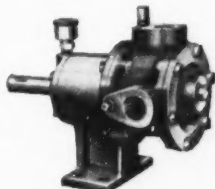
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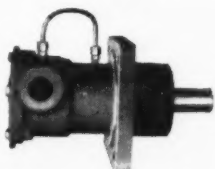
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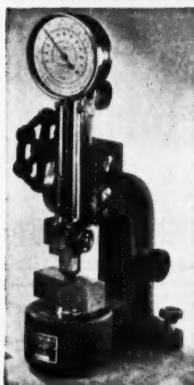


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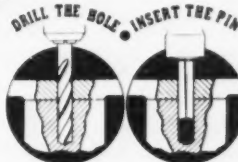
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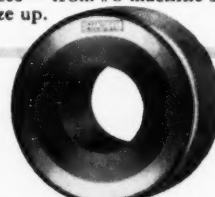
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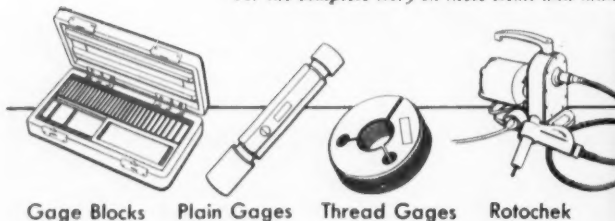


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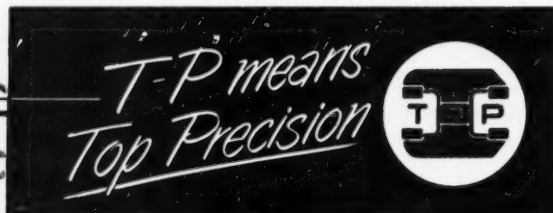


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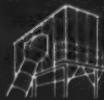


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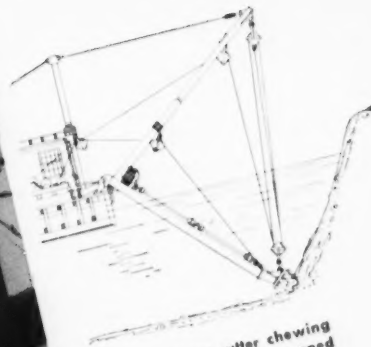
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To accommodate its wide range of spindle speeds—40 in all—ranging from 69 to 1920 RPM, and to insure precision at any speed, Cleveland mounts the spindle on Timken® bearings in semi-flexible mounts. This permits any expansion during high speed operation without affecting accuracy.

Timken tapered roller bearings hold shafts and spindles in rigid alignment. Line contact between rollers and races provides extra load-carrying capacity. Gears mesh smoothly with minimum wear under even the heaviest loads. Because of their tapered construction, Timken bearings carry radial and thrust loads in any combination.

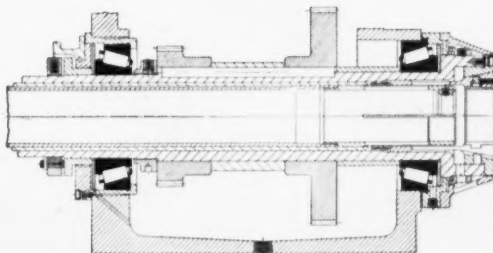
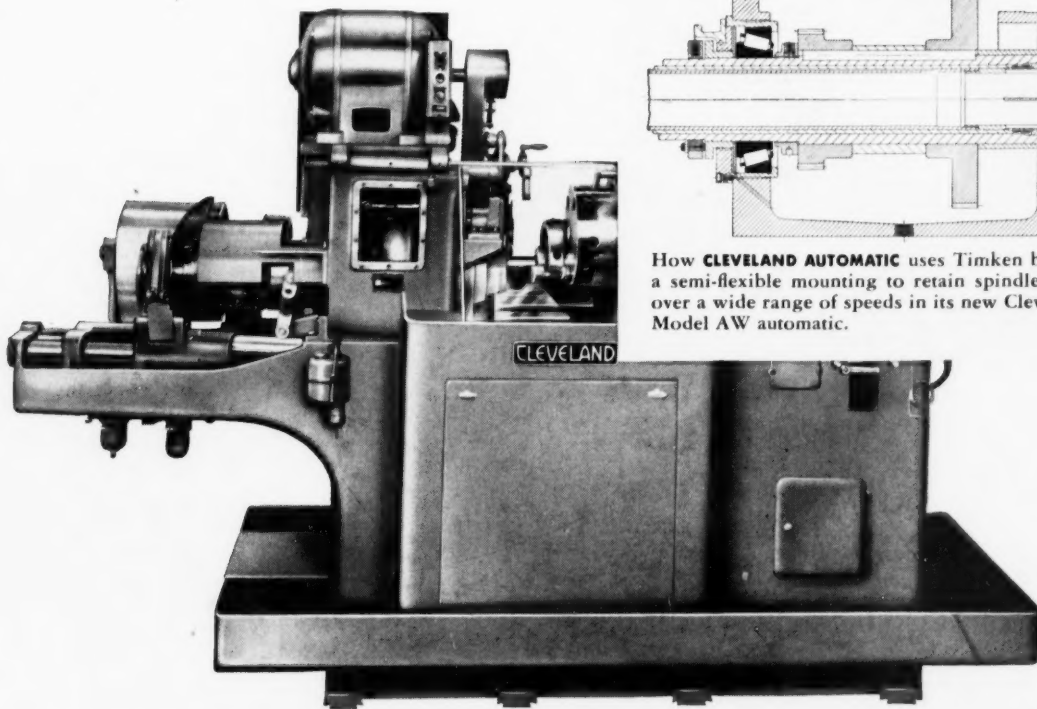
The true rolling motion and incredibly smooth surface finish of Timken bearings practically eliminate friction. Shafts and housings are

held concentric, making closures more effective.

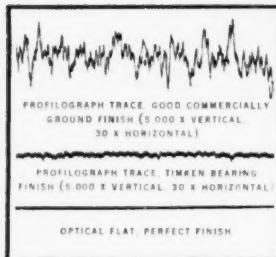
Be sure to specify Timken bearings when you build or buy machine tools. They normally last the life of the machine. Look for the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.



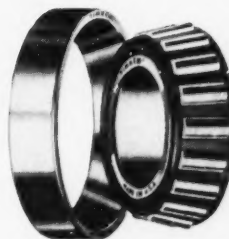
How CLEVELAND AUTOMATIC uses Timken bearings in a semi-flexible mounting to retain spindle precision over a wide range of speeds in its new Cleveland 2½" Model AW automatic.



## SMOOTH TO MILLIONTHS OF AN INCH

Surface finish of high quality Timken bearing rollers and races is so smooth that it takes a profilograph to measure its smoothness. This instrument measures surface variations to a millionth of an inch, as shown at the left.

**TIMKEN**  
TRADE-MARK REG. U. S. PAT. OFF.  
**TAPERED ROLLER BEARINGS**



NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST →← LOADS OR ANY COMBINATION ↗ ↘